



SOUTH CAROLINA ELECTRIC & GAS COMPANY

Cayce, South Carolina

V.C. SUMMER NUCLEAR STATION

UNITS 2 AND 3

TRANSMISSION LINE SITING and ENVIRONMENTAL REPORT

for the

VCS2-Lake Murray 230 kV Line No. 2

and a segment of the

VCS2-St. George 230 kV Line No. 1

Fairfield, Richland, Newberry and Lexington Counties, South Carolina

JULY 2011

Prepared for SCE&G by:

*Pike Energy Solutions, LLC
Facilities Planning & Siting Division
10101 Claude Freeman Drive
Suite 100-W
Charlotte, NC 28262
(704) 510-3156*

TABLE OF CONTENTS

1.0	Introduction and Overview of New 230 kV Lines Associated with V.C. Summer Nuclear Station Units 2 and 3
1.1	Background Information
1.2	Required New 230 kV Lines Associated with VCSNS Units 2 and 3
2.0	Alternate Transmission Line Routes Considered
2.1	Transmission Line Route Selection Overview
3.0	VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Description
3.1	Transmission Line Description
3.2	Estimated Project Cost
4.0	The Affected Environment
4.1	Physiography
4.2	Land Cover
4.3	Surface Water Hydrology
4.4	Wildlife
4.5	Fisheries
4.6	Rare, Threatened and Endangered Species
4.7	Cultural Resources
4.8	Scenic Resources
5.0	Consequences of the Proposed Action
5.1	Soils
5.2	Prime Farmlands and Farmlands of Statewide Importance
5.3	Water Resources
5.4	Flood-Prone Areas
5.5	Land Use
5.6	Land Cover
5.7	Wildlife
5.8	Cultural Resources
5.9	Scenic Resources
5.10	Rare, Threatened and Endangered Species
5.11	Population
5.12	Aviation
5.13	Noise, Radio, and Television Interference
5.14	Safety
5.15	Electric and Magnetic Fields
5.16	Ozone

FIGURES

- 4.0-1 VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Data Collection and Analysis Area
- 5.2-1 Prime Farmland and Soils of Statewide Importance
- 5.2-2 USGS Quadrangle Map
- 5.3-1 Hydrography
- 5.3-2 Wetlands
- 5.4-1 FEMA Flood Zones
- 5.5-1 Aerial Photography
- 5.5-2 Land Use
- 5.5-3 Occupied Buildings
- 5.6-1 Land Cover
- 5.8-1 Cultural Resources
- 5.9-1 Visibility From Roads
- 5.10-1 Natural Resources
- 5.11-1 Population Density
- 5.12-1 Aviation Facilities

APPENDICES

Appendix A	References and Data Sources
Appendix B	Cultural Resources Management Plan and Agreement
Appendix C	Phase I Archaeological Survey Report
Appendix D	Historic Resources Letter Report
Appendix E	Biological Assessment Report – USFWS Listed Species
Appendix F	Biological Survey Report – State Listed Species
Appendix G	Visual Impact Assessment of NRHP-Listed/Eligible Properties

1.0 Introduction and Overview of New 230 kV Lines Associated with V.C. Summer Nuclear Station Units 2 and 3

South Carolina Electric & Gas Company ("SCE&G") has prepared this report pursuant to The South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 *et seq.* (1976, as amended), for the proposed double-circuit 230 kilovolt ("kV") transmission line extending from SCE&G's proposed V.C. Summer Nuclear Station Switchyard 2 ("VCSNS Switchyard 2"), to its existing Lake Murray 230/115 kV Substation. The new switchyard and double circuit line are being built in conjunction with SCE&G's two new nuclear generating units, V.C. Summer Nuclear Station Units 2 and 3. The new double-circuit 230 kV line will run within existing right of way and is approximately 22 miles long. One circuit, the VCS2-Lake Murray 230 kV Line No. 2, will terminate at the existing Lake Murray 230/115 kV Substation; the second circuit, the VCS2-St. George 230 kV Line No. 1, will initially terminate at the Lake Murray Substation but will eventually be extended to a new St. George 230/115 kV substation that SCE&G plans to build near St. George, South Carolina.¹ Once extended to this new substation, the VCS2-St. George 230 kV Line No. 1 will be approximately 98 miles long. This siting and environmental report focuses on the VCS2-Lake Murray 230kV Line No. 2 and the approximate 22-mile segment of the VCS2-St. George 230 kV Line No. 1 that will initially terminate at the Lake Murray Substation.² Throughout this report, the two (2) proposed 230 kV line circuits will be referred to collectively as **VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1** or **VCS2-Lake Murray Line No. 2 /St. George Line No. 1**.

The VCS2-Lake Murray 230 kV Line No. 2 and the VCS2-St. George 230 kV Line No. 1 are two of four new 230 kV transmission line circuits SCE&G must build in order to reliably transmit the power generated by V.C. Summer Nuclear Station Units 2 and 3 to its customers.³ In addition to information in this report that is specific to the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, chapters 1, 2, and 3 of this report also include general information about the other SCE&G 230 kV lines that are required in conjunction with the addition of Units 2 and 3 at the V.C. Summer Nuclear Station.

¹ The circuit that will ultimately continue to St. George, South Carolina will be temporarily connected to the Lake Murray 230/115 kV Substation for reasons explained in Section 2.1.

² SCE&G plans to file for a Certificate of Environmental Compatibility and Public Convenience and Necessity pursuant to the South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 *et seq.* (1976, as amended), for the remaining segment of the VCS2-St. George 230 kV Line No. 1 (approximately 76 miles) and for the second 230 kV circuit that will run to St. George, South Carolina (i.e., VCS2-St. George 230 kV Line No. 2), at a future date.

³ In addition to the new SCE&G 230 kV lines, the South Carolina Public Service Authority must build two (2) new 230 kV lines (circuits) in conjunction with the VCSNS Units 2 and 3 project.

1.1 Background Information

SCE&G, a wholly-owned subsidiary of SCANA Corporation, supplies electrical energy to more than 660,000 customers covering nearly 17,000-square miles of electric service area that includes all or portions of 24 counties in central and southern South Carolina (*Figure 1.1-1*).

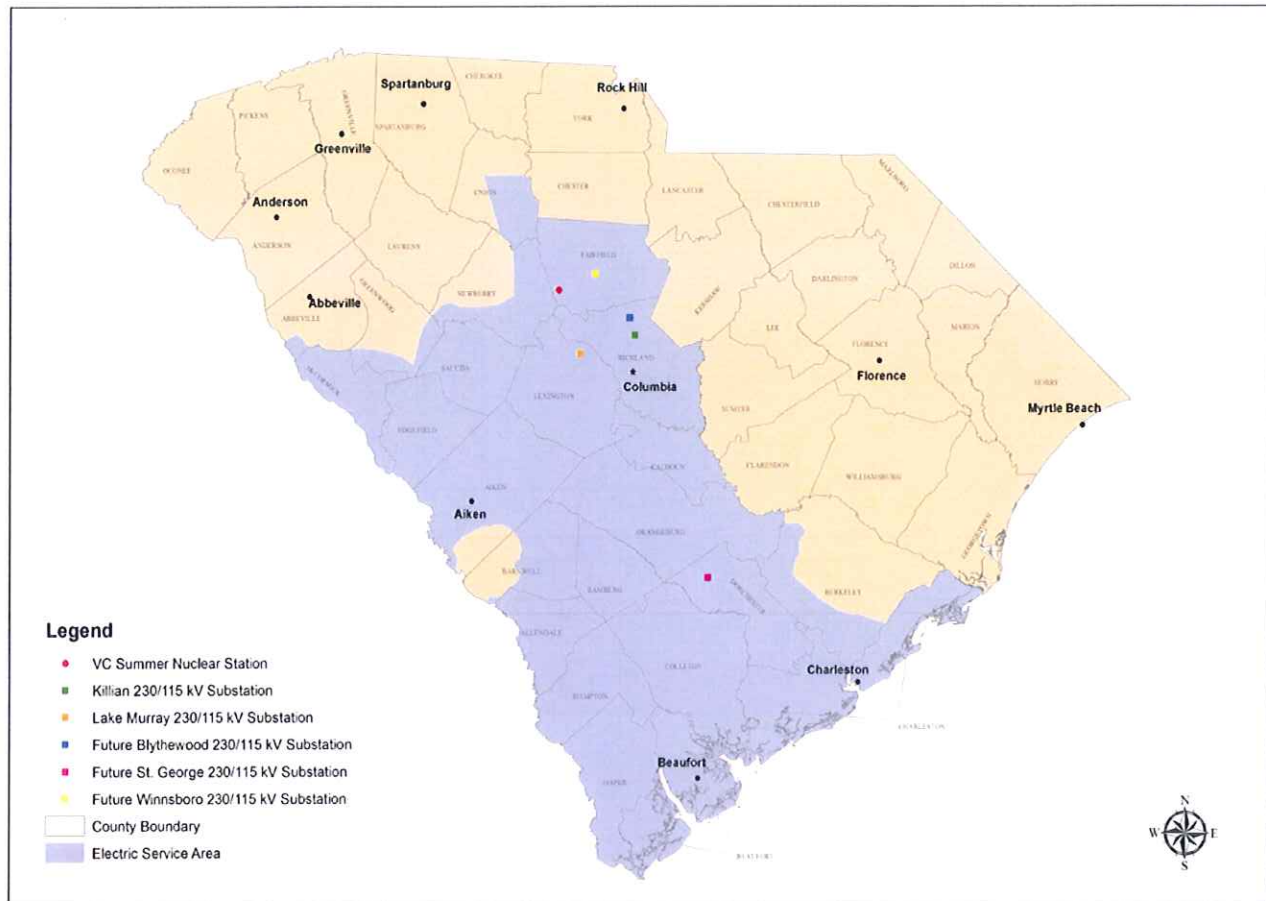


Figure 1.1-1 SCE&G Electric Service Area

To maintain an adequate supply of reliable, electrical energy to serve the projected future demand throughout South Carolina, SCE&G and Santee Cooper submitted an application on March 31, 2008, to the Nuclear Regulatory Commission ("NRC") requesting the issuance of a combined construction and operating license ("COL") for two new nuclear generating units. The COL, when issued, will authorize SCE&G and Santee Cooper to build and operate two additional nuclear generating units at the existing V.C. Summer Nuclear Station site near Jenkinsville, South Carolina. Each unit will have a net electrical output of 1,117 megawatts. Additionally, on May 30, 2008, SCE&G filed with the Public Service Commission of South Carolina a Combined Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity and for a

Base Load Review Order for the construction and operation of the new nuclear units. On March 2, 2009, the Commission issued Order No. 2009-104(A) granting SCE&G, among other things, a Certificate of Environmental Compatibility and Public Convenience and Necessity for the new nuclear units.

Throughout this report, the two new nuclear generating units, V.C. Summer Nuclear Station Unit 2 and Unit 3, are referred to as **VCSNS Units 2 and 3**; the existing nuclear generating unit at the V.C. Summer Nuclear Station is referred to as **VCSNS Unit 1**. The existing electrical switchyard associated with VCSNS Unit 1 is referred to as **VCSNS Switchyard 1**; and the switchyard that will serve VCSNS Units 2 and 3 is referred to as **VCSNS Switchyard 2**.

1.2 Required New 230 kV Lines Associated with VCSNS Units 2 and 3

SCE&G and Santee Cooper have determined that six (6) new 230 kV circuits originating at the V.C. Summer Nuclear Station are necessary to reliably interconnect the generated capacity of VCSNS Units 2 and 3 to their respective electric transmission grids. SCE&G plans to construct four (4) new 230 kV circuits; Santee Cooper will construct two (2) new 230 kV circuits. Below is a listing and summary description of the four (4) new SCE&G 230 kV circuits:

1. VCS2-Lake Murray 230 kV Line No. 2

This new 230 kV circuit will connect the future VCSNS Switchyard 2 to SCE&G's existing Lake Murray 230/115 kV Substation located near SCE&G's McMeekin and Saluda Hydro Stations, approximately three (3) miles southwest of Irmo, South Carolina. This line is referred to as the **VCS2-Lake Murray 230 kV Line No. 2**.

2. VCS2-St. George 230 kV Lines No. 1 and No. 2

These two new 230 kV circuits will originate at the VCSNS Switchyard 2 and run to SCE&G's new 230/115 kV substation to be constructed near St. George, South Carolina. These 230 kV circuits are referred to collectively in this report as the **VCS2-St. George 230 kV Lines**.

3. VCS1-Killian 230 kV Line

This new 230 kV circuit will run between the existing VCSNS Switchyard 1 and SCE&G's existing Killian 230/115 kV Substation, approximately six (6) miles south of Blythewood, South Carolina. This line is referred to as the **VCS1-Killian 230 kV Line**.

The scheduled completion dates for the new SCE&G 230 kV lines are shown in Chart 1.2-1.

Chart 1.2-1: Scheduled Completion Dates for SCE&G 230 kV Lines Associated with VCSNS Units 2 and 3

VCS2-Lake Murray 230 kV Line No. 2 and the segment of the VCS2-St. George Line No. 1 that will run from the VCSNS Switchyard 2 to, and be temporarily terminated on, the Lake Murray 230/115 kV Substation	December 31, 2014
VCS2-St. George 230 kV Line No. 1 (Lake Murray-St. George Segment) and VCS2-St. George Line No. 2	December 31, 2018
VCS1-Killian 230 kV Line	December 31, 2014

The following schematic diagram, Figure 1.2-1, displays the four (4) new lines SCE&G must build to transmit power from VCSNS Units 2 and 3.

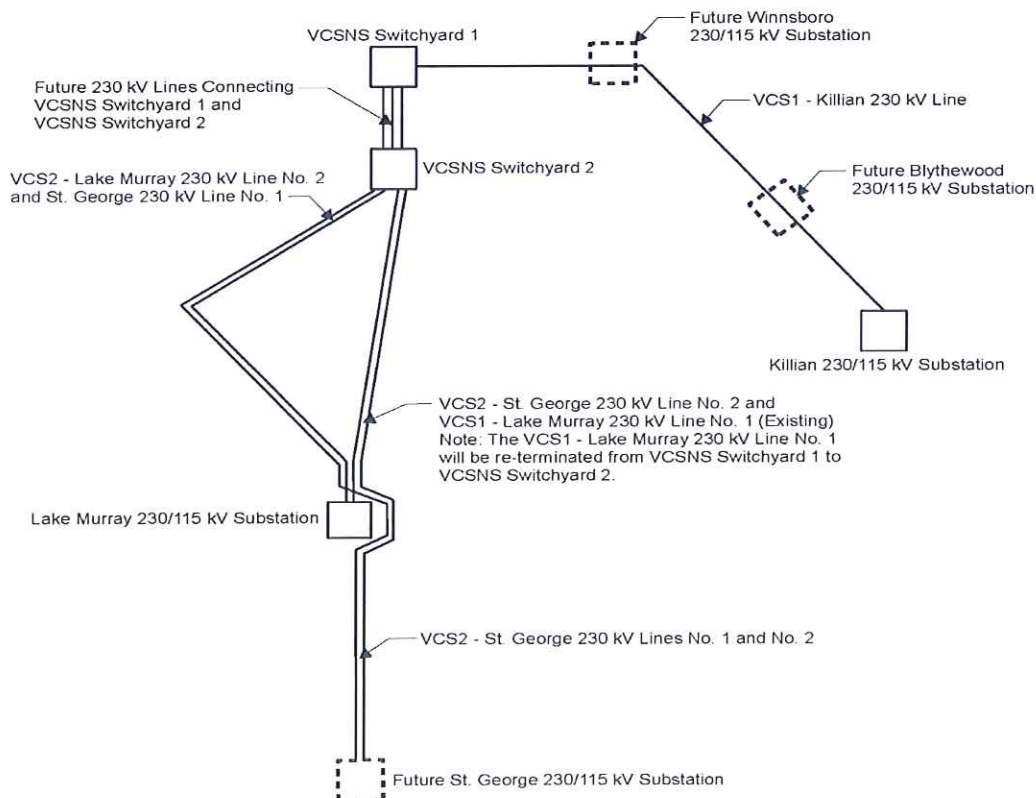


Figure 1.2-1 Schematic Diagram of Required New SCE&G 230 kV Lines

2.0 Alternate Transmission Line Routes Considered

2.1 Transmission Line Route Selection Overview

To support a timely application filing with the NRC for a COL for VCSNS Units 2 and 3, SCE&G conducted siting studies in late 2007 and 2008 to identify potential routes for the VCS1-Killian 230 kV Line and VCS2-St. George 230 kV Lines No. 1 and No. 2. At the time of the siting studies, SCE&G anticipated that the VCS2-Lake Murray 230 kV Line No. 2 would be constructed within an existing SCE&G right-of-way for its entire length; consequently, SCE&G did not include this line in the siting studies to determine a potential line route. Hence, the objective of the siting studies was to identify potential routes for the VCS1-Killian and VCS2-St. George Lines No. 1 and 2 through relatively low-constraint areas, as determined by the application of data collection and analysis methodologies inherent to SCE&G's formal, comprehensive transmission line siting process. The development of potential routes allowed the quantification of impacts to land use, environmental resources, cultural resources, and scenic resources in the vicinity of each potential route. Additionally, impacts were assessed and quantified along the planned existing right-of-way route of the VCS2-Lake Murray 230 kV Line No. 2.

The siting studies and the quantification of impacts associated with both the existing right-of-way route planned for the future VCS2-Lake Murray 230kV Line No. 2 and the potential routes for the other lines allowed SCE&G to provide potential transmission line impact data to the NRC to support preparation of the Draft Environmental Impact Statement for VCSNS Units 2 and 3 in a timely manner. Providing the data to the NRC complied with requirements of the Environmental Policy Act that the Environmental Impact Statement for VCSNS Units 2 and 3 include all impacts ("cumulative impacts") associated with the proposed action, including associated transmission lines. SCE&G concluded that land use, environmental, cultural, and scenic resource effects associated with the final, precise line routes would be very similar in magnitude to the effects that were assessed for both the planned existing right-of-way route of the VCS2-Lake Murray 230 kV Line No. 2 and the potential routes for the other lines.

When the impact data associated with the planned route of VCS2-Lake Murray 230 kV Line No. 2 and the potential routes for the other lines were submitted to the NRC in August 2008, SCE&G anticipated conducting siting studies according to their formal, comprehensive three phase siting process to select final routes for the VCS1-Killian 230 kV Line and the VCS2-St. George 230 kV Lines. SCE&G planned to replace the potential routes with the final routes and quantify impacts associated with them on a schedule that would support their licensing and construction on a timely

basis relative to completion of VCSNS Units 2 and 3. The following schedule was developed for the detailed siting studies:

<u>Line</u>	<u>Planned Siting Study Timeframe</u>
VCS2-Lake Murray 230 kV Line No. 2	No siting study required
VCS1-Killian 230 kV Line	2011-2012
VCS2-St. George 230 kV No. 1 and No. 2 Lines	2015-2016

Concurrent with the 2008 transmission line siting studies that identified the potential routes and two 2009 comprehensive siting studies SCE&G conducted for two segments of the VCS1-Killian 230 kV Line,⁴ SCE&G investigated the possibility of utilizing existing rights-of-way for all four (4) of the new 230 kV lines. Although the potential routes that had been developed in the 2008 siting studies paralleled existing transmission line rights-of-way for significant distances, the decision to conduct investigations to determine the viability of building the new 230 kV lines within existing rights-of-way was made due to significant scheduling considerations and comments SCE&G received from several state and federal agencies. SCE&G was keenly aware that conducting comprehensive siting studies and selecting final routes, surveying the routes, conducting comprehensive biological and archaeological studies, and acquiring right-of-way posed substantial schedule risks in terms of completing line construction on a schedule that would support completion schedules of VCSNS Units 2 and 3. Additionally, during meetings and telephone conferences with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the State Historic Preservation Office, and the South Carolina Department of Natural Resources, agency representatives expressed strong preferences for the use of existing rights-of-way, if practical, as compared to siting and developing new green field transmission line routes. SCE&G's existing right-of-way utilization investigation focused both on the use of available, unoccupied portions of existing rights-of-way and on engineering studies to determine the viability of redesigning/rebuilding/relocating existing lines within the rights-of-way to provide space for the addition of the new 230 kV lines.

By the third quarter of 2010, SCE&G determined that all four (4) of the new 230 kV circuits could be built on existing rights-of-way, with one minor exception. Only the Blythewood-Killian

⁴ Although siting studies were initiated for two (2) segments of the VCS1-Killian Line that will run between the Winnsboro, S.C. area and the Killian 230/115 kV Substation, SCE&G eventually decided to place one (1) of the segments on existing right-of-way; therefore, only one (1) siting study resulted in the selection of a new route (Blythewood-Killian Segment). Reference SCE&G Transmission Line Siting and Environmental Report for the VCS1-Killian 230kV Line dated July 2011.

Segment of the future VCS1-Killian 230 kV Line, approximately 6.0 miles in length, would require the acquisition of new right-of-way.

The existing rights-of-way utilization study resulted in a decision to change the planned route for the VCS2-Lake Murray 230 kV Line No. 2 from one existing right-of-way to another one. At the time the 2008 siting study to identify potential routes for the VCS1-Killian 230 kV Line and the VCS2-St. George 230 kV Lines was conducted, SCE&G planned to construct the VCS2-Lake Murray No. 2 Line within the existing VCS1-Lake Murray 230 kV Line No. 1 right-of-way. This plan proposed removing/rebuilding the existing VCS1-Lake Murray 230kV Line No. 1 from a single-circuit 230 kV line on wooden H-Frame structures to a single pole, double-circuit 230 kV line on steel or concrete structures. To accomplish this, the existing VCS1-Lake Murray 230 kV Line No. 1 would need to be de-energized for extended periods of time, which would introduce system operational risks under certain conditions. During the rights-of-way utilization study, SCE&G devised a plan that allows the VCS1-Lake Murray 230 kV Line No. 1 to remain in continuous service during construction of the new 230 kV circuits associated with the VCSNS Units 2 and 3 project. This plan calls for building the VCS2-Lake Murray 230 kV Line No. 2 circuit and VCS2-St. George 230 kV Line No. 1 circuit as a double-circuit 230 kV line on SCE&G's existing Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-way. These two SCE&G rights-of-way intersect at a point referred to in this report as "Chapin Junction". The Saluda Hydro-Newberry right-of-way ends near SCE&G's existing Lake Murray 230/115kV substation. Both rights-of-way will accommodate the new line with minimal modifications. The Parr Hydro-Chapin Junction segment of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will share the right-of-way with an existing SCE&G distribution line; the Saluda Hydro-Newberry right-of-way portion (Chapin Junction-Lake Murray segment) will be shared with an existing double-circuit 115 kV lattice tower line (Saluda Hydro-Newberry 115 kV Lines No. 1 and 2). The existing VCS1-Lake Murray 230 kV Line No. 1 will eventually be removed from service and rebuilt as a double-circuit line to accommodate the VCS2-St. George 230 kV Line No. 2 circuit. At that time, however, the double circuit VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be complete from the VCSNS Switchyard 2 to the Lake Murray 230/115 kV Substation. The VCS2-St. George Line No. 1 circuit will be temporarily terminated at the substation and will be operated as the VCS2-Lake Lake Murray Line No. 1 until the existing VCS1-Lake Murray 230 kV Line No. 1 is re-terminated from VCSNS Switchyard 1 to Switchyard 2 and upgraded to a double circuit 230 kV Line to accommodate the segment of the VCS2-St. George 230 kV Line No. 2 that will run with it to the Lake Murray area.⁵

⁵ The existing VCS1-Lake Murray 230 kV Line No. 1 will be re-terminated from VCSNS Switchyard 1 to VCSNS Switchyard 2 and will be renamed the VCS2-Lake Murray 230 kV Line No. 1.

The following narratives (1, 2, & 3) describe the final routes for the VCS2-Lake Murray 230 kV Line No. 2, the VCS2-St. George 230 kV Lines No. 1 and No. 2, and the VCS1-Killian 230 kV Line:

1. **VCS2-Lake Murray 230 kV Line No. 2** – This 230 kV circuit will connect the VCSNS Switchyard 2 to the existing Lake Murray 230/115 kV Substation near SCE&G's McMeekin Steam Generating Plant and Saluda Hydro Station. The length of the VCS2-Lake Murray 230 kV Line No. 2 is approximately 22 miles. The line will be built entirely within existing right-of-way by utilizing portions of SCE&G's Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-way. Both rights-of-way will accommodate the new line with minimal modifications. The VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be built beside an existing SCE&G distribution line on the Parr Hydro-Chapin right-of-way; the Saluda Hydro-Newberry right-of-way segment will be shared with an existing double-circuit 115 kV lattice tower line. The VCS2-Lake Murray 230 kV Line No.2 will be constructed as a single pole, double-circuit 230 kV line to accommodate the VCS2-St. George 230kV Line No.1 from the VCSNS Switchyard 2 to the Lake Murray 230/115kV Substation.
2. **VCS2-St. George 230 kV Lines No. 1 and No. 2** – These two 230 kV circuits will originate at the VCSNS Switchyard 2 and run to a new 230/115 kV substation near St. George, South Carolina. The length of the VCS2-St. George Line No. 1 will be approximately 98 miles; the VCS2-St. George Line No. 2 will be approximately 94 miles long. Departing the switchyard, the VCS2-St. George Line No. 1 will run with the new VCS2-Lake Murray 230 kV Line No. 2 along the existing Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-ways to the existing Lake Murray 230/115 kV Substation area. The VCS2-St. George Line No. 2 will exit the VCSNS Switchyard 2 and run with the existing VCS1-Lake Murray 230 kV Line No. 1 to a point where it will intersect the VCS2-Lake Murray Line No.2/St. George Line No. 1 near the Lake Murray 230/115 kV Substation. From this intersection, the VCS2-St. George Lines No. 1 and 2 will run together in various existing SCE&G rights-of-way for approximately 76 miles to a new 230/115 kV Substation near St. George, South Carolina. For the most part, existing SCE&G single pole or H-Frame 115 kV and 230 kV lines will be removed and rebuilt as single pole, double circuit 115/230 kV and/or 230/230 kV configured lines on existing rights-of-way to accommodate the VCS2-St. George 230 kV Lines No. 1 and 2.

3. **VCS1-Killian 230 kV Line** – Originating at the VCSNS Switchyard 1, this 230 kV circuit will run to SCE&G's existing Killian 230/115 kV Substation. The total length is approximately 37 miles and is routed entirely within existing SCE&G rights-of-way except for the Blythewood-Killian Segment, which is approximately 6 miles long. The line will be constructed within SCE&G's existing Parr-Winnsboro right-of-way from the VCSNS Switchyard 1 to Winnsboro (VCSNS-Winnsboro Segment) and the existing Winnsboro-Blythewood right-of-way from Winnsboro to Blythewood (Winnsboro-Blythewood Segment). The Blythewood-Killian Segment is planned to occupy a new right-of-way that SCE&G sited and selected by executing its comprehensive, three-phase transmission line siting process. This segment will also be constructed as a double circuit 230/115 kV line to accommodate the VCS1-Killian 230 kV line and a required, second 115 kV Line between the existing Killian and future Blythewood 230/115 kV substation.

The total combined circuit length of the four (4) new SCE&G 230 kV lines (VCS2-Lake Murray Line No. 2, VCS2-St. George Lines No. 1 and No. 2, and VCS1-Killian) will be approximately 251 circuit-miles (157 corridor-miles). Except for approximately 6 miles of new right-of-way associated with the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line, the four new lines will be built entirely within existing SCE&G rights-of-way corridors. In addition to these four (4) new 230 kV lines, SCE&G will construct three (3) 230 kV tie lines on the V.C. Summer Nuclear Station site to connect the existing VCSNS Switchyard 1 to the future switchyard that will serve VCSNS Units 2 and 3 (VCSNS Switchyard 2). The cumulative length of the three (3) tie lines will be approximately 3 miles, and they will be located entirely on property owned by SCE&G (the VCSNS site).

Figure 2.1-1 displays the locations of the four (4) new SCE&G 230 kV circuits that will be built in conjunction with VCSNS Units 2 and 3; Figure 2.1-2 displays the locations of the three (3) tie lines that will connect the existing VCSNS Switchyard 1 to new VCSNS Switchyard 2.

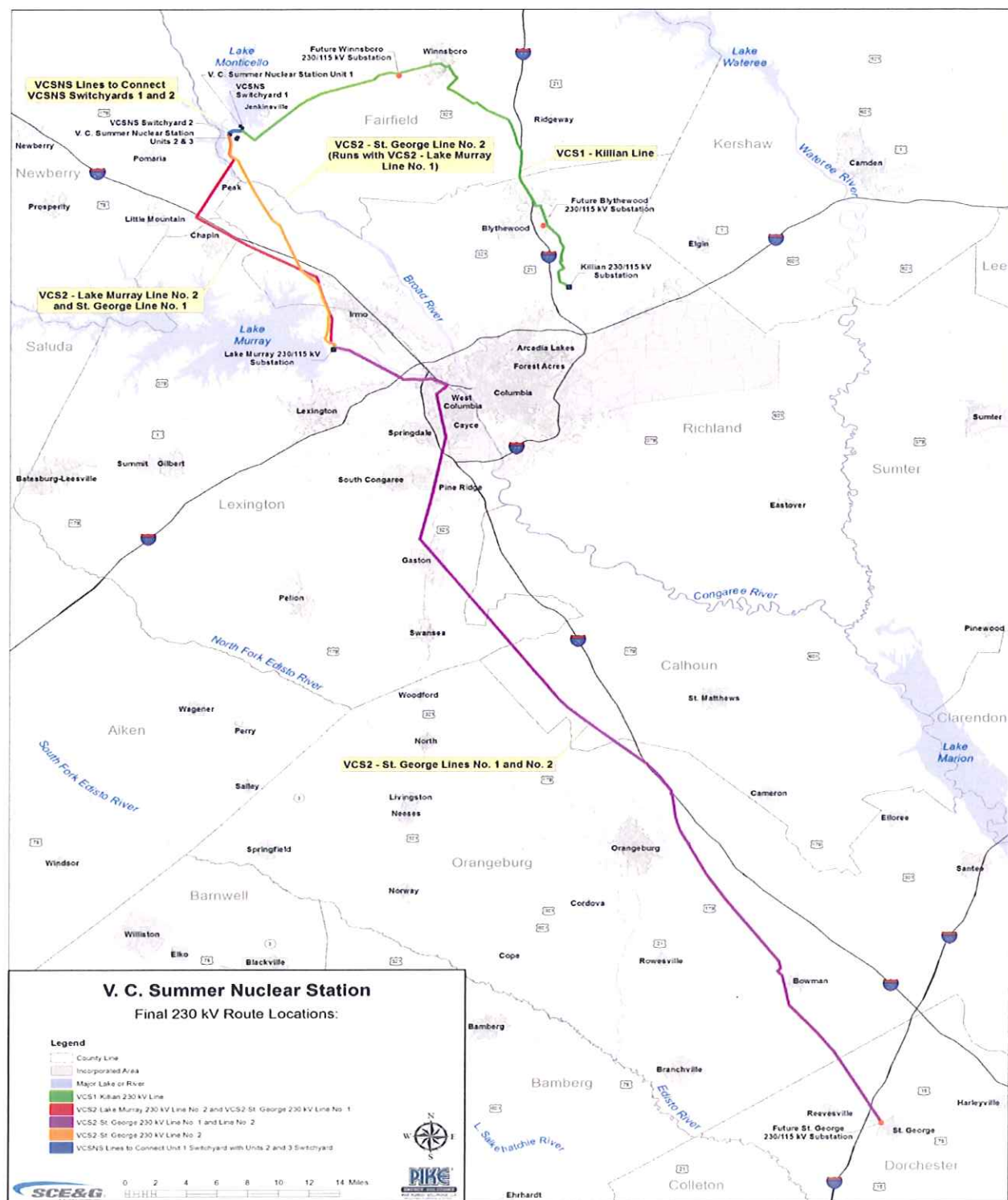


Figure 2.1-1 SCE&G 230 kV Lines Associated with VCSNS Units 2 and 3 Line Route Locations
(VCS1-Killian 230 kV Line; VCS2-Lake Murray 230 kV Line No. 2; and VCS2-St. George 230 kV Lines No. 1 and No. 2)

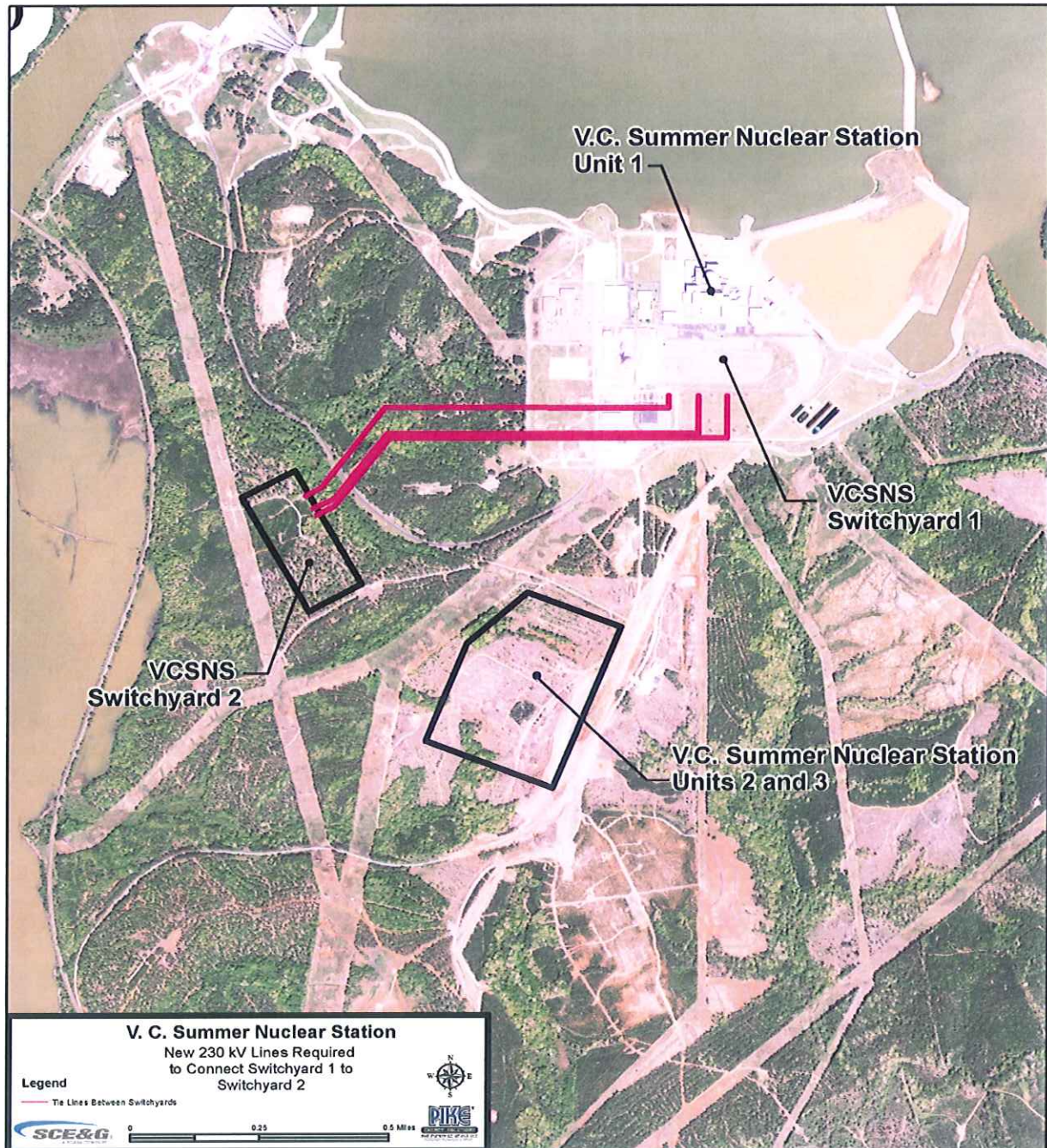


Figure 2.1-2 Line Route Locations of SCE&G 230 kV Lines Required to Connect VCSNS Switchyard 1 to VCSNS Switchyard 2

3.0 VCS2-Lake Murray Line No.2/St. George Line No. 1 Description

3.1 Transmission Line Description

SCE&G will use single pole, double-circuit (back-to-back circuit configuration) steel structures to construct the VCS2-Lake Murray Line No. 2/St. George Line No. 1 for the approximately 22 mile distance to the Lake Murray substation. As discussed in Section 1.0, the St. George Line No. 1 circuit will eventually continue approximately 76 additional miles to a new 230/115 kV substation near St. George, South Carolina. Generally, the height range of the structures will be from 85-120 feet, and the structure spacing distance will range from 500-700 feet. The double-circuit line will be built on SCE&G property for approximately 2.5 miles from the VCSNS Switchyard 2 to the Parr Hydro Plant at the Broad River (VCSNS Switchyard 2-Parr Hydro Segment). From the Broad River, it will share the existing Parr Hydro-Chapin right-of-way with an existing SCE&G distribution line for approximately 4.5 miles to the point where the Parr Hydro-Chapin right-of-way intersects SCE&G's Saluda Hydro-Newberry right-of-way. As previously stated, this intersection point is known as Chapin Junction, and this line segment will be known as the Parr Hydro-Chapin Junction Segment. At Chapin Junction, the line will turn in a southerly direction and share the Saluda Hydro-Newberry right-of-way with an existing double-circuit 115 kV lattice tower line for approximately 15 miles to the Lake Murray 230/115 kV Substation (Chapin Junction-Lake Murray Segment). Figure 3.1-1 shows the three (3) segments of the line.

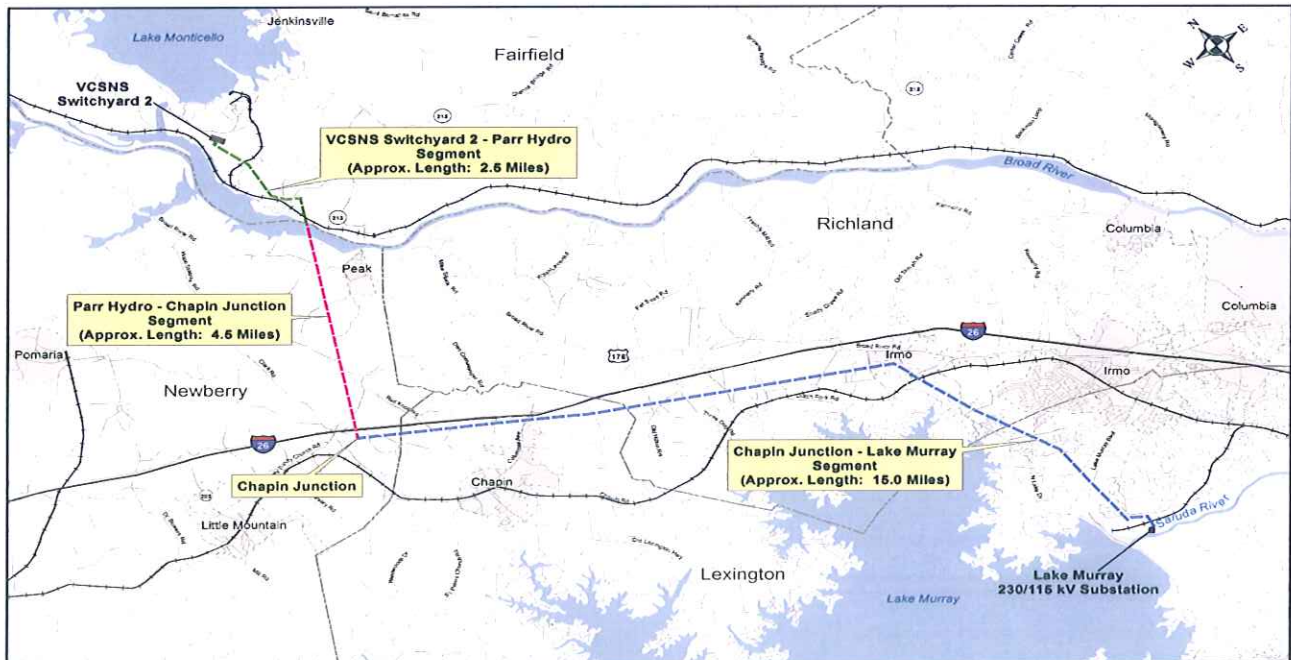


Figure 3.1-1 VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route Segments

Figures 3.1-2 through 3.1-4, below, graphically depict structure types to be used on various segments of the VCS2-Lake Murray Line No. 2/St. George Line No 1.

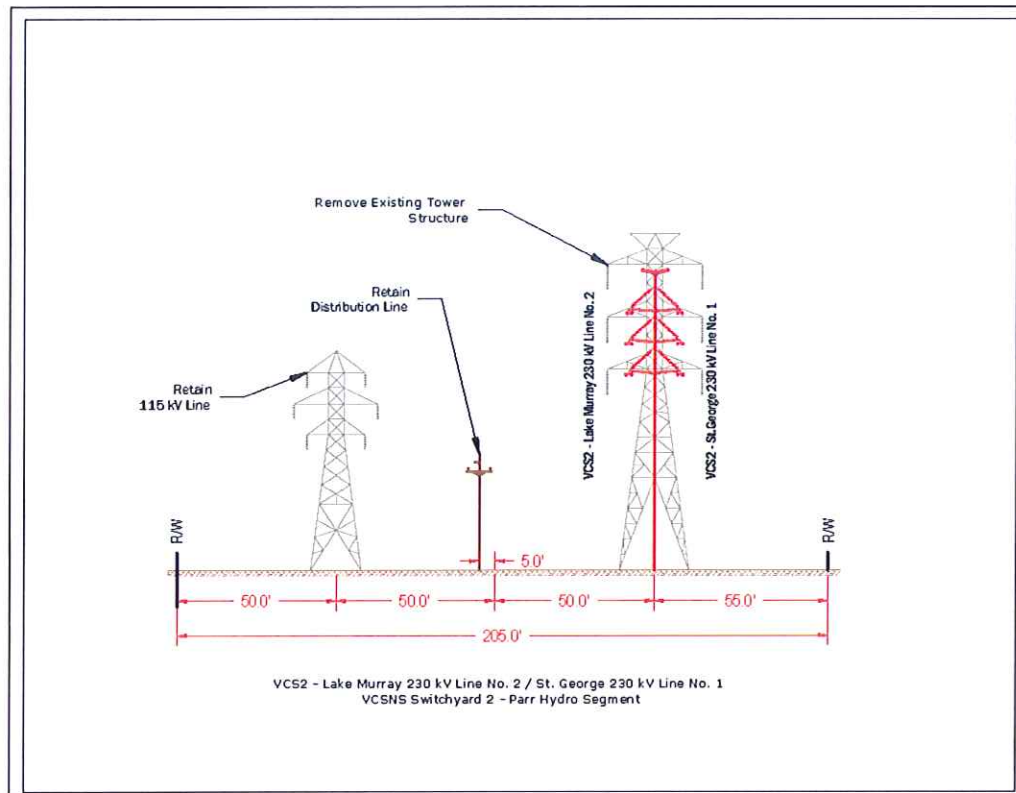


Figure 3.1-2 VCSNS Switchyard 2-Parr Hydro Segment

Note: The 230 kV Line that will be removed, as indicated on Figure 3.1-2, is a portion of a double-circuit 230 kV line that interconnects with Duke Energy's 230 kV system at their Newport and Bush River Transmission Substations. SCE&G will re-terminate these circuits into the VCSNS Switchyard 1 and 2 in a way that will allow removal of this section and utilization of the route segment for the VCS2-Lake Murray 230 kV Line No. 2/St George Line No. 1.

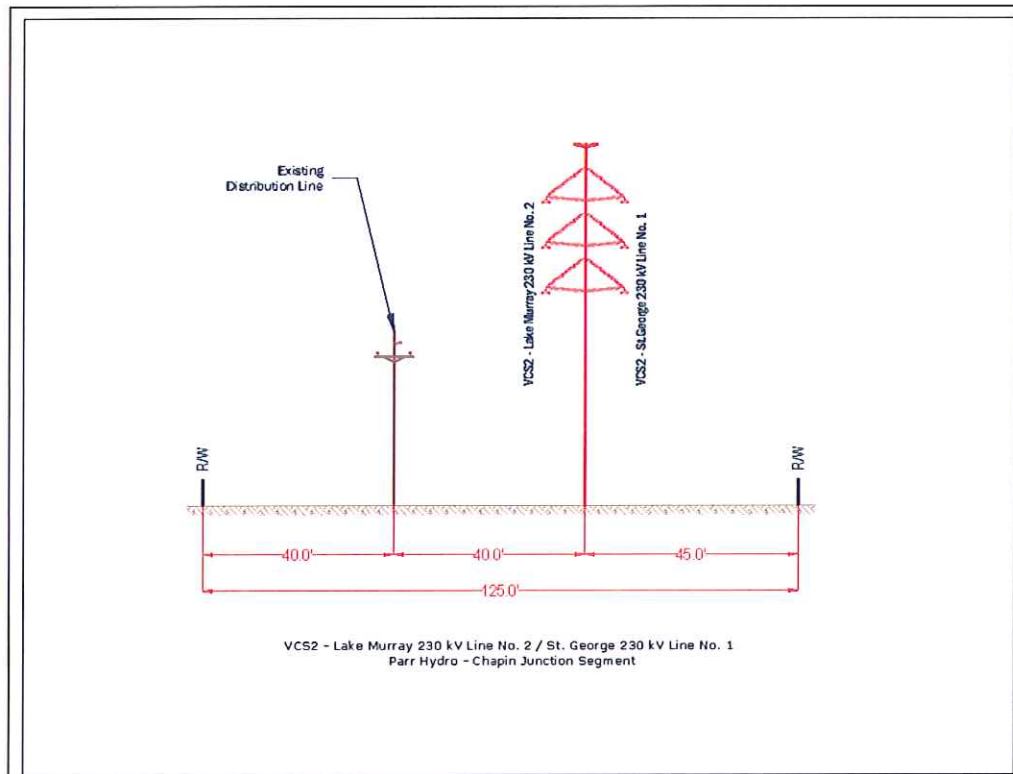


Figure 3.1-3 Parr Hydro-Chapin Junction Segment

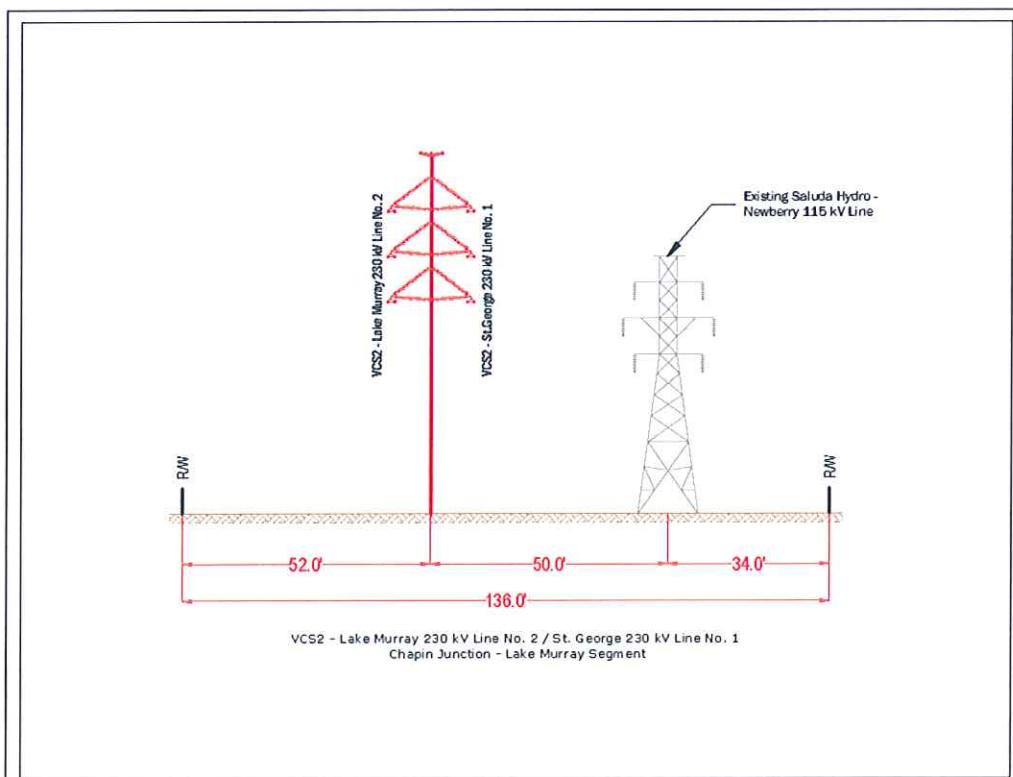


Figure 3.1-4 Chapin Junction-Lake Murray Segment

3.2 Estimated Project Cost

SCE&G completed a comprehensive cost estimate for the VCS2-Lake Murray Line No. 2/St. George Line No. 1 that is shown in Chart 3.2-1. The total estimated cost includes line engineering, right-of-way preparation, materials, installation of new structures, stringing conductor, environmental protection, repairs/stabilization to any disturbed areas and other miscellaneous costs as applicable.

Chart 3.2-1: Estimated Project Cost-VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1

Estimated Transmission Line Construction Cost	Estimated Right-Of-Way Preparation Costs	Total Estimated VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Cost
\$27,895,000	\$920,000	\$28,815,000

4.0 THE AFFECTED ENVIRONMENT

SCE&G compiled information on the affected environment of the area within which the future VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 kV Line will be located (*Figure 4.0-1*) by reviewing published literature, interpreting aerial photography, reviewing agency information, and performing field investigations.⁶ A Geographic Information System (“GIS”) was used to analyze, model, and manage the data. This process enabled the development of accurate and detailed databases that characterize environmental resources, land use, cultural resources, and scenic conditions of the area surrounding the future double-circuit 230 kV line route, which facilitated an analysis of likely impacts.

4.1 Physiography

South Carolina covers more than 32,000 square miles and is divided into three major physiographic provinces. A small area along the northwestern boundary of the State lies in the Blue Ridge physiographic province. The Piedmont physiographic province occupies the area between the Blue Ridge province and the Fall Line, and the area between the Fall Line and the Atlantic Ocean comprises the Coastal Plain physiographic province. The Coastal Plain province is comprised of three sub-regions: Upper Coastal, Middle Coastal, and Lower Coastal. The Blue Ridge and Piedmont provinces are composed of igneous and metamorphic rocks, mostly gneiss, schist, phyllite, and slate. Elevations are as high as 650 ft. above mean sea level (“msl”) at the Fall Line and over 3,500 ft. above msl in the Blue Ridge province. The Coastal Plain province consists of variations of sand, clay, and limestone that overlay the Piedmont rocks. Elevations range from msl at the coast to as much as 650 ft. msl at the Fall Line.

The VCS2-Lake Murray Line No. 2/St. George Line No. 1 will reside entirely in the Piedmont physiographic province.

⁶ As a reminder, in this report, the terms “VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 kV Line” and “VCS2-Lake Murray Line No. 2/St. George Line No. 1” do not include the approximate 76-mile segment of the VCS2-St. George 230 kV Line No. 1 that will eventually run from an area near the Lake Murray 230/115 kV Substation to the new 230/115 kV Substation near St. George, South Carolina.

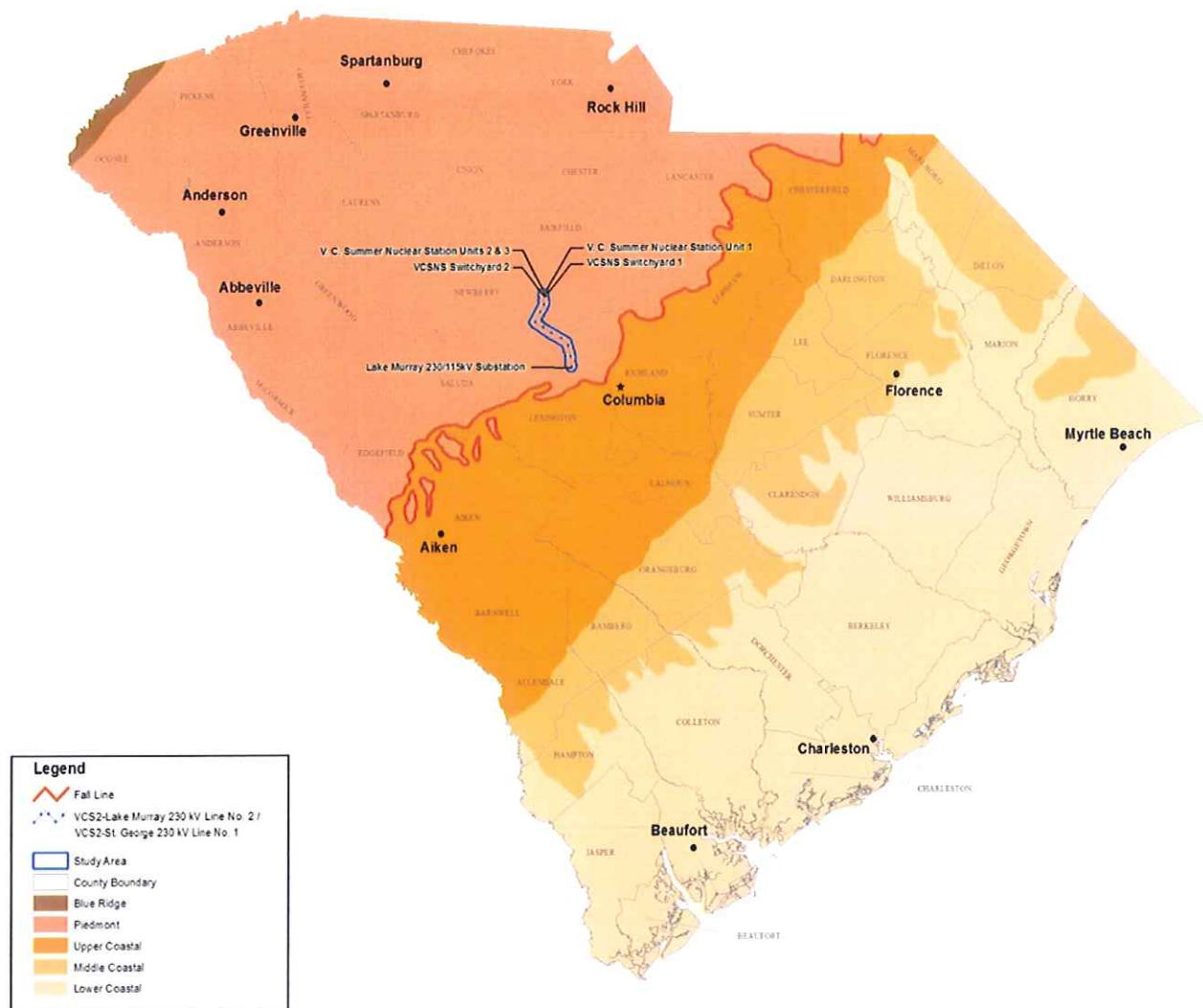


Figure 4.1-1 South Carolina Physiographic Regions

4.2 Land Cover

Piedmont Physiographic Region

The rolling uplands of the Piedmont landscape are predominantly a mosaic of agricultural land and managed woodland, with a history of clearing and economic use that dates back to the earliest times of European settlement. Hardwood-dominated forests occupy relatively narrow floodplains and scattered upland sites, while pine and pine-hardwood forests occupy the majority of forested upland sites. To quantify the effects the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will have on various land cover types, SCE&G mapped the land cover conditions within 1,000 feet of the proposed centerline of the future double-circuit line.

Included below are descriptions of the major land cover classifications in the Piedmont physiographic region and the fauna that are common to the habitat provided by the classifications.

Oak-hickory Forest

Occurring throughout the state but most characteristic of rolling uplands in the Piedmont, oak-hickory forest is a widely distributed community that varies from site to site. Occurring in highly fragmented stands, later successional stages tend to be made up of a diverse assemblage of hardwoods, primarily oaks and hickories, as co-dominants in combination with pines. Understory, shrub and herbaceous layers are present in varying degrees, represented by diverse woody and non-woody species. Vegetation on most sites consists of early- to mid-successional managed stands of pine and pine-hardwood forest. The understory in pure pine stands is often open, but in mixed or older stands, it is dominated by the hardwoods characteristic of the site. Common pine species of the Piedmont include shortleaf (*Pinus echinata*) and loblolly (*P. taeda*), with the former better adapted to dry, fine textured upland soils and loblolly achieving maximum growth on deep soils with good moisture and drainage.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: American Kestrel, Eastern Wood Pewee, Red-cockaded Woodpecker, Wood Thrush, Pine Snake

High Priority: Pine Woods Snake

Moderate Priority: Scarlet Tanager, Eastern Fox Squirrel

River Bottom Forest

River bottoms, or “bottomland forests”, consist of hardwood-dominated woodlands with moist soils that are usually associated with major river floodplains. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on some lower elevation sites in the southern section on the Piedmont province, but is not as prevalent as in the broader floodplains of the coastal plain. Compared to the coastal plain, the floodplains of major rivers in the Piedmont are confined by topography to relatively narrow corridors.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson’s Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat

High Priority: Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole

Moderate Priority: American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

Piedmont Small Stream Forest

Piedmont small stream forests are distinguished from forest communities on larger floodplains because of differences between the scales of the ecosystems. In smaller floodplains, the levees, sloughs and ridges are largely absent or poorly developed. Flooding regime is also more variable between small watersheds than larger ones. Soils are various alluvial types that are seasonally or intermittently flooded. The forest has an open to dense understory or shrub layer and a sparse to dense herb layer. The canopy has a mixture of bottomland and mesophytic trees including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), sweetgum (*Liquidambar styraciflua*), tulip tree (*Liriodendron tulipifera*), American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Wood Thrush, Yellow-crowned Night Heron, Tiger Salamander

High Priority: Acadian Flycatcher, River Cooter, Spiny Softshell Turtle, Yellowbelly Turtle, Mink, Swamp Rabbit

Moderate Priority: Great Blue Heron, Great Egret, Louisiana Waterthrush

Cove Forest

Cove forests are botanically diverse, well-developed hardwood forests occurring on scattered rich and generally small sites that are less than 200 acres. Usually, these forests occur on protected bluffs in association with small stream forests or river bottoms. No single species tends to dominate. Shrub species are usually numerous and the herbaceous flora is fairly rich, with many spring ephemerals. Canopy and understory is composed of hardwoods including beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), black gum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), white oak (*Quercus alba*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), southern sugar maple (*saccharum*), basswood (*Tilia heterophylla*), ironwood (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), witch-hazel (*Hamamelis virginiana*), and hop-hornbeam (*Ostrya virginiana*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Eastern Wood Pewee, Kentucky Warbler, Wood Thrush, Webster's Salamander

High Priority: Four-toed Salamander

Moderate Priority: Scarlet Tanager

Grassland and Early Successional Habitats

A variety of open habitats occupies a considerable portion of upland sites in the Piedmont, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. The vegetation on most sites is oak-hickory forest, although many sites are maintained in early successional stages.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Southern Hognose Snake

High Priority: Barn Owl, Meadow Vole

Moderate Priority: American Woodcock, Bewick's Wren

General Condition of Piedmont Land Cover Types

To a greater degree than in other regions, the vegetation in the Piedmont has been altered by human activity. Cotton agriculture changed much of the original hardwood and shortleaf pine (*Pinus echinata*) forests into fields. Fields eroded, often losing all topsoil. By the 1930's, various factors, including the Great Depression and boll weevil outbreaks as well as severe erosion, led to widespread farmland abandonment in the Piedmont.

Loblolly pine (*Pinus taeda*) was introduced to the Piedmont during the nineteenth century as a cash lumber crop; this pine now dominates much of the region. According to a U.S. Forest Service survey, loblolly-dominated pine forests occupy over two million acres in South Carolina's Piedmont region (Conner and Sheffield 2000). Although loblolly pine plantations are found throughout the region, they are much more prevalent in some areas, in particular the southwestern Piedmont.

Land cover types and quantities within 1,000 feet of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 are presented in Chart 4.2-1.

Chart 4.2-1 Land Cover Classifications and Quantities within 1,000' of the VCS2-Lake Murray 230 kV Line No. 2 / VCS2-St. George 230 kV Line No. 1

	Acres
Barren	13.1
Cropland	146.5
Grass / Pasture	725.3
Hardwood Forest	1114.5
Mixed Hardwood / Pine Forest	541.9
Pine Forest	1413.9
Scrub / Shrub	650.6
Urban / Built-up	679.6
Water	120.1
Wetland	9.4

Along the Parr Hydro-Chapin Junction Segment of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, the land cover types within the portions of existing right-of-way to be cleared and adjacent to it include hardwood forests, pine forests, riparian vegetation and scrub/shrub vegetation. Similar land cover types are present adjacent to the cleared Saluda Hydro-Newberry right-of-way within which the Chapin Junction-Lake Murray Segment of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be built. The dominant land cover type within the cleared right-of-way is categorized as "Scrub/Shrub". This classification is comprised, primarily, of grasses and upland early succession plant communities commonly found in cleared rights-of-way. SCE&G rights-of-way have been maintained in early succession community conditions and/or grasses to protect the integrity of the existing transmission lines. This community is primarily composed of herbaceous species, with few pine and hardwood seedlings. Dominant species include blackberry, goldenrod, goldenaster, Canadian horseweed, dog fennel, late flowering thoroughwort, broomsedge bluestem, Vasey's grass, yellow crownbeard, sortbeard plumegrass, rabbit tobacco, hogwort (*Croton capitatus*), Small's ragwort (*Packera anonyma*), forked bluecurls (*Trichostema dichotomum*), calico aster, sericea (*Lespedeza cuneata*), purple top (*Tridens flavus*), fescue (*Festuca* spp.), orangegrass, and hyssopleaf thoroughwort (*Eupatorium hyssopifolium*), all of which are relatively common in utility rights-of-way in the Piedmont province of South Carolina.

4.3 Surface Water Hydrology

The majority of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 route, approximately 17 miles, is located in the Lower Broad River drainage basin; approximately 5 miles of the route drains into the Saluda River basin. On the VCSNS site, the line route crosses several unnamed tributaries that drain into the Broad River above the Parr Shoals Dam. The remainder of the line route in the Lower Broad River drainage basin drains into the river below the dam. The

following is a listing of the drainages crossed by the line route that drain into the Broad River below the Parr Shoals Dam:

Broad River (crossed just below the Parr Shoals Dam)

Mayo Creek

Crims Creek and un-named tributaries

Risters Creek and un-named tributaries

Wateree Creek and un-named tributaries

Boyd Branch

Wildhorse Branch

Metz Branch

In the Saluda River basin, the line route crosses one unnamed tributary that flows directly into Lake Murray. The route crosses Yost Creek and several of its unnamed tributaries, all of which flow into and from Rawls Creek, which drains into the Saluda River below the Dreher Shoals Dam.

All waters crossed by the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route are classified by the South Carolina Department of Health and Environmental Control ("SCDHEC") as "freshwaters (FW)", which are defined as "suitable for primary and secondary contact recreation, a source for drinking water after conventional treatment in accordance with the requirements of SCDHEC, suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and suitable for industrial and agricultural uses." Stream water quality in the immediate vicinity of the line route is generally good, and small ponds are common occurrences in the rural areas the line route runs through.

Precipitation is the basic source of water resources in Fairfield, Richland, Newberry and Lexington Counties, South Carolina. Normally, wet and dry years seem to alternate; however, some periods of several dry years occur. Droughts have occurred in the region in 1954-55, 1986, 1996, and 1998-2002. The historical average annual precipitation for Fairfield County is 45.84 inches; Richland is 46.87 inches; Newberry County is 48.27 inches; and Lexington County is 47.56 inches. Annual precipitation is fairly well distributed throughout in the region, with midsummer being the wettest, historically, and fall the driest. The period from April to September, which is the span of the growing season, receives an average of about 67 percent of the annual total (USDA 1980). Measurable snowfall in the area occurs infrequently.

Through a review of the National Wetland Inventory mapping, the execution of field inspections, and comprehensive “desktop” wetland delineations based on hydrographic data, land cover and topography, it was determined that approximately 8 acres of wetlands reside in the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 right-of-way.

4.4 Wildlife

Land use and natural plant communities strongly influence wildlife diversity within South Carolina. In the Piedmont province, bottomland forests offer habitat for white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*). Other representative species in this area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), prothonotary warbler (*Protonotaria citrea*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), red-shouldered hawk (*Buteo lineatus*), parula warbler (*Parula americana*), green frog (*Rana clamitans*), bird-voiced tree frog (*Hyla avivoca*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*).

The pine forests provide habitat that supports the eastern diamondback rattlesnake (*Crotalus adamanteus*), green anole (*Anolis carolinensis*), northern cardinal (*Cardinalis cardinalis*), bobwhite quail (*Colinus virginianus*), and eastern fox squirrel (*S. niger*). Other representative species found in the forested areas in the vicinity of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route include the white-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), wild turkey, red-tailed hawk (*Buteo jamaicensis*), pine warbler (*Dendroica pinus*), eastern towhee (*Pipilo erythrophthalmus*), pine snake (*Pituophis melanoleucus*), oak toad (*Bufo quercicus*), and flatwoods salamander (*Ambystoma cingulatum*).

Common in recent clear-cut areas in the vicinity of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 right-of-way are scrub/shrub communities (early succession) and regenerating hardwoods such as sapling scrub oaks, hickory and red maple. The representative species found in these areas include the eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-tailed hawk, Carolina wren, northern mockingbird (*Mimus polyglottos*), yellow-breasted chat (*Icteria virens*), eastern cottontail, golden mouse (*Peromyscus nuttalli*), and white-tailed deer.

4.5 Fisheries

Most of the area's perennial streams are typical of South Carolina's lower piedmont freshwater streams where an abundance of finfish and mussels can be found. The major waters of the region include Broad River, Saluda River, Mayo Creek, Crims Creek, Risters Creek, Wateree Creek, Yost Creek, and the Saluda River (including Lake Murray). Species supported in these systems include largemouth bass (*Micropterus salmoides*), catfish (*Ictalurus* spp.), and several sunfish species (*Lepomis* spp.). Other waters in the area are represented by non-game species such as the rosyside dace (*Clinostomus funduloides*), yellowfin shiner (*Notropis lutipinnis*), and the creek chub (*Semotilus atromaculatus*).

Farm ponds found throughout the region offer opportunities to fish for largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* spp.), and catfish (*Ictalurus* spp.).

4.6 Rare, Threatened and Endangered Species

Records of the United States Fish and Wildlife Service ("USFWS") and South Carolina Heritage Trust Program were reviewed to determine listed rare, threatened and endangered ("RTE") species that could potentially be affected by construction of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1. Charts 4.6-1, 4.6-2, 4.6-3 and 4.6-4, below, show the RTE species for Richland, Fairfield, Newberry and Lexington Counties, South Carolina, respectively, which are included on the USFWS lists. Charts 4.6-5, 4.6-6, 4.6-7 and 4.6-8 are the South Carolina Heritage Trust Program lists for the four counties.

Chart 4.6-1: Fairfield County – U.S. Fish and Wildlife Service List

Listed Species in Fairfield County				
Species	Federal Status	State Status	Habitat	Threats
Birds				
Bald eagle <i>Haliaeetus leucocephalus</i>	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young

Chart 4.6-2: Richland County – U.S. Fish and Wildlife Service List

Listed Species in Richland County				
Species	Federal Status	State Status	Habitat	Threats
Birds				
Bald eagle <i>Haliaeetus leucocephalus</i>	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young
Red-cockaded woodpecker <i>Picoides borealis</i>	E	E	nest in mature pine with low understory vegetation (<1.5m); forage in pine and pine hardwood stands > 30 years of age, preferably > 10" dbh	reduction of older age pine stands and to encroachment of hardwood midstory in older age pine stands due to fire suppression
Wood stork <i>Mycteria americana</i>	E	E	primarily feed in fresh and brackish wetlands and nest in cypress or other wooded swamps	decline due primarily to loss of suitable feeding habitat; other factors include loss of nesting habitat, prolonged drought/flooding, raccoon predation on nests, and human disturbance of rookeries
Fishes				
Shortnose sturgeon <i>Acipenser brevirostrum</i>	E	E	occur in most major river systems along the eastern seaboard	habitat alterations from discharges, dredging or disposal of material into rivers, or related development activities involving estuarine/riverine mudflats and marshes; commercial exploitation up until the 1950s
Plants				
Smooth coneflower <i>Echinacea laevigata</i>	E	E	prairie remnants, open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils	collection, fire suppression, exotic weeds
Rough-leaved loosestrife <i>Lysimachia asperulaefolia</i>	E	E	in the sandhills of the Carolinas in ecotones or edges between longleaf pine uplands and pond pine pocosins, on moist to seasonally saturated sands and on shallow organic soils overlaying sand	fire suppression, drainage, siltation from erosion, and, to a lesser extent, residential and industrial development

Chart 4.6-3: Newberry County – U.S. Fish and Wildlife Service List

Chart 4.6-4: Lexington County – U.S. Fish and Wildlife Service List

Listed Species in Lexington County				
Species	Federal Status	State Status	Habitat	Threats
Birds				
Bald eagle <i>Haliaeetus leucocephalus</i>	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young
Red-cockaded woodpecker <i>Picoides borealis</i>	E	E	nest in mature pine with low understory vegetation (<1.5m); forage in pine and pine hardwood stands > 30 years of age, preferably > 10" dbh	reduction of older age pine stands and to encroachment of hardwood midstory in older age pine stands due to fire suppression
Fishes				
Shortnose sturgeon <i>Acipenser brevirostrum</i>	E	E	occur in most major river systems along the eastern seaboard	habitat alterations from discharges, dredging or disposal of material into rivers, or related development activities involving estuarine/riverine mudflats and marshes; commercial exploitation up until the 1950s
Plants				
Smooth coneflower <i>Echinacea laevigata</i>	E	E	prairie remnants, open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils	collection, fire suppression, exotic weeds
Schweinitz's sunflower <i>Helianthus schweinitzii</i>	E	E	prairie and glade remnants, clearings and edges of upland woods on clayey soils with a high gravel content	highway and utility line right-of-way maintenance and expansion; residential and commercial development; exotic weeds

Listed Species in Newberry County				
Species	Federal Status	State Status	Habitat	Threats
Birds				
Bald eagle <i>Haliaeetus leucocephalus</i>	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young

Chart 4.6-5: Heritage Trust Program List for Fairfield County, South Carolina

April 15, 2010

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Vertebrate Animals					
<i>Etheostoma collis</i>	Carolina Darter		SE-Endangered	G3	SNR
<i>Haliaeetus leucocephalus</i>	Bald Eagle		SE-Endangered	G5	S2
<i>Sciurus niger</i>	Eastern Fox Squirrel			G5	S4
Invertebrate Animals					
<i>Villosa delumbis</i>	Eastern Creekshell			G4	S4
Animal Assemblage					
Waterbird Colony				GNR	SNR
Vascular Plants					
<i>Aster georgianus</i>	Georgia Aster	C: Candidate		G2 G3	SNR
<i>Carex oligocarpa</i>	Eastern Few-fruit Sedge			G4	SNR
<i>Dirca palustris</i>	Eastern Leatherwood			G4	S2
<i>Dodecatheon meadia</i>	Shooting-star			G5	S1?
<i>Frasera caroliniensis</i>	Columbo			G5	S2
<i>Isoetes piedmontana</i>	Piedmont Quillwort			G3	S2
<i>Minuartia uniflora</i>	One-flower Stitchwort			G4	S3
<i>Ophioglossum vulgatum</i>	Adder's-tongue			G5	S2
<i>Osmorhiza claytonii</i>	Hairy Sweet-cicely			G5	S2
<i>Philadelphus hirsutus</i>	Streambank Mock-orange			G5	S2
<i>Rhododendron eastmanii</i>	May White			G2	S2
<i>Scutellaria parvula</i>	Small Skullcap			G4	S2 S3
<i>Sedum pusillum</i>	Granite Rock Stonecrop			G3	S2
Communities					
Mesic mixed hardwood forest				G5	S4
Oak- hickory forest				G5	S5

See Legend for Heritage Trust Program List at the bottom of Chart 4.6-8

Chart 4.6-6: Heritage Trust Program List for Richland County, South Carolina

August 24, 2009

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
<u>Vertebrate Animals</u>					
<i>Condylura cristata</i>	Star-nosed Mole			G5	S3?
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat		SE-Endangered	G3 G4	S2?
<i>Etheostoma collis</i>	Carolina Darter		ST-Threatened	G3	SNR
<i>Fundulus diaphanous</i>	Banded Killifish			G5	S1
<i>Haliaeetus leucocephalus</i>	Bald Eagle		SE-Endangered	G5	S2
<i>Heterodon simus</i>	Southern Hognose Snake			G2	SNR
<i>Hyla andersonii</i>	Pine Barrens Treefrog		ST-Threatened	G4	S2 S3
<i>Notropis chiliticus</i>	Redlip Shiner			G4	S1?
<i>Picoides borealis</i>	Red-cockaded Woodpecker	LE: Listed endangered	SE-Endangered	G3	S2
<i>Rhinichthys atratulus</i>	Blacknose Dace			G5	S1
<i>Sciurus niger</i>	Eastern Fox Squirrel			G5	S4
<i>Spilogale putorius</i>	Eastern Spotted Skunk			G5	S4
<i>Sylvilagus aquaticus</i>	Swamp Rabbit			G5	S2 S3
<i>Tyto alba</i>	Barn-owl			G5	S4
<i>Ursus americanus</i>	Black Bear			G5	S3?
<u>Invertebrate Animals</u>					
<i>Elimia catenaria</i>	Gravel Elimia			G4	SNR
<i>Pyganodon cataracta</i>	Eastern Floater			G5	SNR
<i>Strophitus undulatus</i>	Creeper			G5	S2
<i>Villosa delumbis</i>	Eastern Creekshell			G4	S4
<u>Vascular Plants</u>					
<i>Agalinis tenella</i>				G4Q	SNR
<i>Andropogon perangustatus</i>	Narrow Leaved Bluestem			G4Q	S1
<i>Aristida condensate</i>	Piedmont Three-awned Grass			G4?	S2
<i>Aster elliotii</i>	Elliott's Aster			G4	S3
<i>Astragalus michauxii</i>	Sandhills Milkvetch			G3	S3
<i>Balduina atropurpurea</i>	Purple Balduina			G2	S1
<i>Botrychium lunarioides</i>	Winter Grape-fern			G4?	S1
<i>Calamovilfa brevipilis</i>	Pine-barrens Reed-grass			G4	S1
<i>Carex cherokeensis</i>	Cherokee Sedge			G4 G5	S2
<i>Carex collinsii</i>	Collins' Sedge			G4	S2
<i>Carex crus-corvi</i>	Ravenfoot Sedge			G5	S2
<i>Carex eliottii</i>	Elliott's Sedge			G4?	S1
<i>Carex socialix</i>	Social Sedge			G4	S1
<i>Cayaponia quinqueloba</i>	Cayaponia			G4	S1?
<i>Collinsonia serotina</i>	Southern Horse-balm			G3 G4	S1
<i>Coreopsis gladiata</i>	Southeastern Tickseed			G4 G5	SNR
<i>Dryopteris carthusiana</i>	Spinulose Shield Fern			G5	S1
<i>Echniacea laevigata</i>	Smooth Coneflower	LE: Listed endangered		G2G3	S3
<i>Eleocharis robbinsii</i>	Robbins Spikerush			G4 G5	S2
<i>Hymenocallis coronaria</i>	Shoals Spider-lily			G2Q	S2
<i>Hypericum adpressum</i>	Creeping St. John's-wort			G3	S2
<i>Hypericum nitidum</i>	Carolina St. John's-wort			G4	S1
<i>Ile amelanchier</i>	Sarvis Holly			G4	S3
<i>Ipomopsis rubra</i>	Red Standing-cypress			G4 G5	S2
<i>Juncus abortivus</i>	Pinebarren Rush			G4 G5	SNR
<i>Lechea torreyi</i>	Piedmont Pinweed			G4	SNR
<i>Liatris microcephala</i>	Small-head Gayfeather			G3 G4	S1
<i>Lindera subcoriacea</i>	Bog Spicebush			G2G3	S3

Richland County (Continued)					
Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
<i>Lobelia sp. 1</i>	Lobelia			G3	SNR
<i>Ludwigia spathulata</i>	Spatulate Seedbox			G2 G3	S3
<i>Lycopus cokeri</i>	Carolina Bugleweed			G3	S2
<u>Vascular Plants (cont.)</u>					
<i>Lysimachia asperulifolia</i>	Rough-leaved Loosestrife	LE: Listed endangered		G3	S1
<i>Macbridea caroliniana</i>	Carolina Bird-in-a-nest			G2 G3	S3
<i>Magnolia macrophylla</i>	Bigleaf Magnolia			G5	S1
<i>Magnolia pyramidata</i>	Pyramid Magnolia			G4	S1
<i>Myriophyllum laxum</i>	Piedmont Water-milfoil			G3	S2
<i>Nestronia umbellula</i>	Nestronia			G4	S3
<i>Ophioglossum vulgatum</i>	Adder's-tongue			G5	S2
<i>Oxypolis canbyi</i>	Canby's Dropwort	LE: Listed endangered		G2	S2
<i>Paspalum bifidum</i>	Bead-grass			G5	S2
<i>Pityopsis pinifolia</i>	Pine-leaved Golden Aster			G4	S2
<i>Platanthera lacera</i>	Green-fringe Orchis			G5	S2
<i>Potamogeton confervoides</i>	Algae-like Pondweed			G4	S1
<i>Prunus alabamensis</i>	Alabama Black Cherry			G4	S1
<i>Psilotum nudum</i>	Whisk Fern			G5	S1
<i>Pteroglossaspis ecristata</i>	Crestless Plume Orchid			G2 G3	S2
<i>Quercus oglethorpensis</i>	Oglethorpe's Oak			G3	S3
<i>Rhexia aristosa</i>	Awed Meadowbeauty			G3	S3
<i>Rhododendron eastmanii</i>	May White			G2	S1
<i>Rhynchospora inundata</i>	Drowned Hornedrush			G4?	S2?
<i>Rhynchospora macra</i>	Beak Rush			G3	S1
<i>Rhynchospora oligantha</i>	Few-flowered Beaked-rush			G4	S2
<i>Rhynchospora pallida</i>	Pale Beakrush			G3	S1
<i>Rhynchospora stenophylla</i>	Chapman Beakrush			G4	S2
<i>Sarracenia rubra</i>	Sweet Pitcher-plant			G4	S4
<i>Scirpus etuberculatus</i>	Canby Bulrush			G3 G4	SNR
<i>Tofieldia glabra</i>	White False-asphodel			G4	S1 S2
<i>Trepocarpus aethusae</i>	Aethusa-like Trepocarpus			G4 G5	S1
<i>Tridens chapmanii</i>	Chapman's Redtop			G3 G5	S1
<i>Urtica chamaedryoides</i>	Weak Nettle			G4 G5	S2
<i>Vaccinium crassifolium</i> ssp. <i>sempervirens</i>	Rayner's Blueberry			G4 G5T1	S1
<i>Warea cuneifolia</i>	Nuttall Warea			G4	S1
<u>Nonvascular Plant</u>					
<i>Plagiochila sullivantii</i>				G2	SNR
<u>Animal Assemblage</u>					
Waterbird Colony				GNR	SNR

See Legend for Heritage Trust Program List at the bottom of Chart 4.6-8

Chart 4.6-7: Heritage Trust Program List for Newberry County, South Carolina

August 25, 2010

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
<u>Vertebrate Animals</u>					
<i>Haliaeetus leucocephalus</i>	Bald Eagle		ST-Threatened	G5	S2
<i>Mycteria americana</i>	Wood Stork		SE-Endangered	G4	S1 S2
<i>Ursus americanus</i>	Black Bear			G5	S3?
<u>Invertebrate Animals</u>					
<i>Distocambarus youngineri</i>	a Crayfish			G1	S1
<i>Elliptio lanceolata</i>	Yellow Lance			G2 G3	SNR
<u>Vascular Plants</u>					
<i>Dirca palustris</i>	Eastern Leatherwood			G4	S2
<i>Eupatorium fistulosum</i>	Hollow Joe-pye Weed			G5?	SNR
<i>Frasera caroliniensis</i>	Columbo			G5	S2
<i>Heteranthera reniformis</i>	Kidneyleaf Mud-plantain			G5	S1
<i>Juglans cinerea</i>	Butternut			G4	S3
<i>Liparis liliifolia</i>	Large Twayblade			G5	S1
<i>Magnolia pyramidata</i>	Pyramid Magnolia			G4	S1
<i>Monotropsis odorata</i>	Sweet Pinesap			G3	S2
<i>Philadelphus hirsutus</i>	Streambank Mock-orange			G5	S2
<i>Rhododendron eastmanii</i>	May White			G2	S2
<i>Viola pubescens</i> var. <i>leiocarpon</i>	Yellow Violet			G5 T5	S2
<u>Communities</u>					
Basic forest				GNR	S2
Bottomland hardwoods				G5	S4
Cove forest				G5	S4
Oak-hickory forest				G5	S5
<u>Ecological</u>					
Granitic flatrock				G3	S2

See Legend for Heritage Trust Program List at the bottom of Chart 4.6-8

Chart 4.6-8: Heritage Trust Program List for Lexington County, South Carolina

April 25, 2010

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
<u>Vertebrate Animals</u>					
<i>Haliaeetus leucocephalus</i>	Bald Eagle		ST-Threatened	G5	S2
<i>Micrurus fulvius</i>	Eastern Coral Snake			G5	S2
<i>Picoides borealis</i>	Red-cockaded Woodpecker	LE: Listed endangered	SE-Endangered	G3	S2
<i>Sciurus niger</i>	Eastern Fox Squirrel			G5	S4
<i>Seminatrix pygaea</i>	Black Swamp Snake			G5	SNR
<u>Vascular Plants</u>					
<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's Bluestem			G4Q	S1
<i>Aristida condensata</i>	Piedmont Three-awned Grass			G4?	S2
<i>Asplenium pinnatifidum</i>	Lobed Spleenwort			G4	S1
<i>Burmanna biflora</i>	Northern Burmannia			G4 G5	S2
<i>Carex collinsii</i>	Collins' Sedge			G4	S2
<i>Chrysoma pauciflorescens</i>	Woody Goldenrod			G4 G5	S1 S2
<i>Coreopsis gladiata</i>	Southeastern Tickseed			G4 G5	SNR
<i>Euonymus atropurpureus</i>	Eastern Wahoo			G5	S1
<i>Gaylussacia mosieri</i>	Woolly Huckleberry			G4	S1
<i>Hymenocallis coronaria</i>	Shoals Spider-lily			G2Q	S2
<i>Liatris microcephala</i>	Small-head Gayfeather			G3 G4	S1
<i>Lobelia sp. 1</i>	Lobelia			G3	SNR
<i>Lycopus cokeri</i>	Carolina Bugleweed			G3	S2
<i>Menispermum canadense</i>	Canada Moonseed			G5	S2 S3
<i>Myriophyllum laxum</i>	Piedmont Water-milfoil			G3	S2
<i>Nolina Georgiana</i>	Georgia Beargrass			G3 G5	S3
<i>Oxypolis ternata</i>	Piedmont Cowbane			G3	S1
<i>Pityopsis pinifolia</i>	Pine - leaved Golden Aster			G4	S2
<i>Polygala nana</i>	Dwarf Milwort			G5	S1
<i>Rhynchospora alba</i>	White Beakrush			G5	SX
<i>Rhynchospora inundata</i>	Drowned Hornedrush			G4?	S2?
<i>Rhynchospora leptocarpa</i>	Narrow-fruited Beaksedge			G3	S1
<i>Rhynchospora stenophylla</i>	Chapman Beakrush			G4	S2
<i>Rorippa sessiliflora</i>	Stalkless Yellowcress			G5	SNR
<i>Sagittaria isoetiformis</i>	Slender Arrow-head			G4?	S3
<i>Sarracenia rubra</i>	Sweet Pitcher-plant			G4	S4
<i>Scirpus subterminalis</i>	Water Bulrush			G4 G5	SNR
<i>Sporobolus teretifolius</i>	Wire-leaved Dropseed			G2	S1
<i>Stylisma pickeringii</i> var. <i>pickeringii</i>	Pickering's Morning-glory			G4T3	S2
<i>Tridens carolinianus</i>	Carolina Fluff Grass			G3 G4	S2
<i>Vaccinium crassifolium</i> ssp. <i>sempervirens</i>	Rayner's Blueberry			G4 G5 T1	S1
<i>Xyris chapmanii</i>	Chapman's Yellow-eyed Grass			G3	S1

Lexington County (continued)					
Scientific Name	Common Name	USES Designation	State Protection	Global Rank	State Rank
<u>Communities</u>					
Atlantic white cedar swamp				G2	S2
Bay forest				G3 G4	S3
Bottomland hardwoods				G5	S4
Oak-hickory forest				G5	S5
Pine-scrub oak sandhill				G4	S4
Seepage pocosin				G3	S1 S2
Small stream forest				G5	S5
Swamp tupelo pond				G3	S3
Upland pine-wiregrass woodland				G3	S3
Xeric sandhill scrub				G5	S3
<u>Ecological</u>					
Carolina bay				GNR	SNR
Outcrop				GNR	SNR
Sandstone outcrop				GNR	SNR

Legend

- G1 Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction
- G2 Imperiled globally because of rarity or factor(s) making it vulnerable
- G3 Either very rare throughout its range or found locally in a restricted range, or having factors making it vulnerable
- G4 Apparently secure globally, though it may be rare in parts of its range
- G5 Demonstrably secure globally, though it may be rare in parts of its range
- GH Of historical occurrence throughout its range, with possibility of rediscovery
- GX Extinct throughout its range
- G? Status unknown
- GNR Global rank not assigned
- T# Intraspecific taxon (trinomial)

- S1 Critically imperiled state-wide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation
- S2 Imperiled state-wide because of rarity or factor(s) making it vulnerable
- S3 Rare or uncommon in state
- S4 Apparently secure in state
- S5 Demonstrably secure in state
- SA Accidental in state (usually birds or butterflies that are far outside normal range)
- SE Exotic established in state
- SH Of historical occurrence in state, with possibility of rediscovery
- SN Regularly occurring in state, but in a migratory, non-breeding form
- SR Reported in state, but without good documentation
- SX Extirpated from state
- S? Status unknown

4.7 Cultural Resources

SCE&G has entered into a Cultural Resources Management Plan and Agreement (“CRMPA”) with the South Carolina State Historic Preservation Office (“SHPO”) and the U.S. Army Corps of Engineers (“USACE”) regarding management of potential cultural resources within all proposed 230 kV transmission line right-of-way corridors associated with construction of VCSNS Units 2 and 3 (*Appendix B*). The identification, assessment, and protection of cultural resources along the routes of the new 230 kV lines associated with VCSNS Units 2 and 3, including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, will be pursuant to the CRMPA. The terms of the CRMPA are designed to ensure that cultural resources along the new 230 kV lines are properly identified, assessed, and protected during construction and operation of the lines. Moreover, the CRMPA outlines procedures for the proper notification, assessment, protection, and disposition of inadvertent discoveries that may occur during construction activities. SCE&G will adhere to the provisions of the CRMPA as it applies to new and existing right-of-way corridors upon which the new 230 kV lines will be built.

Since the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 is integral to the VCSNS Units 2 and 3 project, the analysis of direct and indirect impacts to cultural resources resulting from line construction must be completed according to the U.S. Nuclear Regulatory Commission Environmental Standard Review Plan (NUREG 1555, Section 5.1.3 Historic Properties). Pursuant to the requirements of NUREG 1555, SCE&G engaged Brockington and Associates, Inc. (“Brockington”), a national cultural resources consulting firm headquartered in Norcross, Georgia, to conduct background research to determine previously recorded architectural and archaeological resources in the vicinity of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route. As required by the CRMPA, Brockington prepared and submitted a “cultural resources study plan” to SHPO outlining their proposed methodology to execute the work, which included background research on archaeology within 0.5 miles of the proposed line route and background research on historic resources within 1.2 miles of the proposed route. After review, SHPO approved the study plan. The findings of the background research are summarized below.

Archaeology

Brockington conducted background research at the Information Management Division of the South Carolina Institute of Anthropology and Archaeology (“SCIAA”) and the South Carolina Department of Archives and History (“SCDAH”), both in Columbia, South Carolina. Brockington copied the relevant maps from the SCIAA site files for the area within 0.5 miles of the VCS2-Lake

Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route centerline and digitized them into a Geographic Information System (“GIS”) database. The recorded sites are summarized according to their National Register of Historic Places (“NRHP”) status in Chart 4.7-1.

Chart 4.7-1: Recorded Archaeological Resources within 1/2 Mile of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1

NHRP Status	Number of Archaeological Resources
Listed on the NRHP	0
Eligible for the NRHP	0
Potentially Eligible for the NRHP	1
Ineligible for the NRHP	9
Eligibility for the NRHP Undetermined	34

SCE&G engaged Brockington to conduct a Phase I Archaeological Resources Survey pursuant to the terms of the CRMPA throughout the right-of-way to be utilized by the future line. The terms require an investigation over areas to be disturbed (tree clearing is defined as a disturbance). Both the Parr Hydro-Chapin Junction and Chapin Junction-Lake Murray Segments of the future line require varying degrees of clearing to establish the full widths of the right-of-way. Rather than limiting the survey to areas where clearing is required, SCE&G opted to conduct a Phase 1 Archaeological Resources Survey of the entire VCS2-Lake Murray Line No. 2/St. George Line No. 1 route except for a segment that is approximately 2 miles long on the VCSNS site. A Phase I Archaeological Resources Survey of this segment was conducted in conjunction with cultural resource investigations on the VCSNS site. Brockington’s Phase I Archaeological Resources Survey extended approximately 20 miles from the Lake Murray 230/115 kV Substation to the VCSNS project boundary. The findings of the Phase I Archaeological Resources Survey conducted by Brockington are documented in a report entitled “*A Phase I Archaeological Resources Survey of the VCS2-Lake Murray 230 kV Line No. 2/ St. George 230 kV Line No. 1* (Appendix C).

Architecture

Brockington conducted a literature review to determine all previously recorded architectural resources within 1.2 miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route’s centerline and digitized all recorded sites into a GIS database. This review of SCDAAH records revealed that one-hundred twenty-eight (128) previously recorded architectural resources

reside within 1.2 miles of the future line, but none occur in the right-of-way. Chart 4.7-2 summarizes the findings of the architectural records review.

Chart 4.7-2: Recorded Architectural Resources within 1.2 Miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route

NRHP Status	Number of Archaeological Resources
Listed on the NRHP	1
Eligible for the NRHP	9
Potentially Eligible for the NRHP*	2
Protected Resource Ineligible for the NRHP (Cemetery)	4
Ineligible for the NRHP**	112

*Includes 1 cemetery

**Includes 19 resources that Brockington believes may be eligible based on the windshield survey

In addition to the literature review to determine the locations and NRHP status of all previously recorded architectural resources within 1.2 miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route, Brockington conducted a “windshield survey” in April and May 2011. The purpose of the windshield survey was to visually inspect all architectural resources that could be seen from public roads and make *preliminary* determinations of NRHP eligibility regarding each one inspected. Of the one-hundred sixteen (116) resources that had been previously recorded as ineligible for the NRHP, Brockington’s windshield inspection determined that nineteen (19) of them should be considered to be potentially eligible resources. Also, Brockington identified an additional twenty (20) aboveground resources, including one historic district, not previously recorded that appear to be eligible for inclusion in the NRHP. Chart 4.7-3 summarizes the findings of the windshield survey.

Chart 4.7-3: Architectural Resources within 1.2 Miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route Based on a Windshield Survey

NRHP Status	Number of Historic Resources
Listed on the NRHP	1
Eligible for the NRHP	50
Not Eligible for the NRHP	97

All resources identified during the windshield survey are ones that would require documentation during a Phase I Cultural Resources Survey as required by Section 106 of the NRHP. Brockington based their opinion regarding NRHP eligibility on the apparent age and visible

architectural integrity of the resources; no research was completed on any of them to determine historical associations they may possess.

Brockington summarized their cultural resources research and windshield reconnaissance for the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 in a letter report dated July 12, 2011 (*Appendix D*).

4.8 Scenic Resources

The degree to which a planned transmission line will affect the scenic environment of the area or region through which it passes is directly related to the scenic quality of the area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic quality is derived from the interrelationship of multiple factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The United States Bureau of Land Management ("BLM") has developed a visual resource inventory methodology for use in managing federal lands under its jurisdiction that considers these factors, and SCE&G applied the BLM criteria when assessing the scenic quality of the area within which the VCS2-Lake Murray 230 kV Line No. 2/ St. George 230 kV Line No. 1 will be located. Chart 4.8-1, adapted from the United States Bureau of Land Management's Visual Resource Rating System, provides information about the criteria used to assess scenic quality.

Chart 4.8-1: Scenic Quality Rating Criteria

Explanation of Rating Criteria
Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind-beaten trees, and joshua trees).
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Color
Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

The scenic quality rating criteria is used to evaluate and score specific areas according to each area's specific scenic characteristics. Guidance for scoring areas for each of the scenic quality rating criteria is provided in Chart 4.8-2.

Chart 4.8-2: Scenic Quality Inventory and Evaluation Chart

Key factors	Rating Criteria and Score	Rating criteria and Score	Rating Criteria and Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.* 5+	Distinctive, though somewhat similar to others within the region. 3	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. 2	Modifications add little or no visual variety to the area, and introduce no discordant elements. 0	Modifications add variety but are very discordant and promote strong disharmony. -4

NOTE: Values for each rating criteria are maximum and minimum scores only. It is also possible to assign scores within these ranges.

* A rating greater than 5 can be given to this criterion in the scarcity category, but should be supported by written documentation.

By applying the appropriate rating criteria and appropriate scores for each of the key factors shown in Chart 4.8-2 based on actual scenic conditions present along the VCS2-Lake Murray 230 kV Line No. 2/ St. George 230 kV Line No. 1 route, SCE&G arrived at total scores for individual sections of the line route that indicate the scenic quality of each section. The following is the BLM explanation of scenic quality, which is indicated by the total scores:

<u>Score</u>	<u>Scenic Quality</u>
19 or higher	High Scenic Quality
12-18	Moderate Scenic Quality
11 or lower	Low Scenic Quality

Scoring Methodology

Landscape architects and professional geographers, on SCE&G's behalf, conducted a geographic information system ("GIS") analysis of vegetation, hydrography, land use, and topography along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route to gain insight into key scenic quality factors including landform, vegetation, water, color, and influence of adjacent scenery. Additionally, a windshield survey was conducted to observe, record, and photograph visual conditions along public roads in the immediate vicinity of the line route. The line route was segmented into six (6) sections based on similarity of scenic conditions represented by each section. Finally, each section was scored using the BLM scoring protocol. The following is a listing of the six (6) scenic quality sections:

1. VCSNS Switchyard 2 to County Road S-20-16
2. County Road S-20-16 to County Road S-36-28
3. County Road S-36-28 to Interstate Highway 26
4. Interstate Highway 26 to Columbia Avenue
5. Columbia Avenue to Rauch-Metz Road
6. Rauch-Metz Road to Lake Murray 230/115 kV Substation

Figure 4.8-1 shows the delineation of the six (6) scenic quality sections.

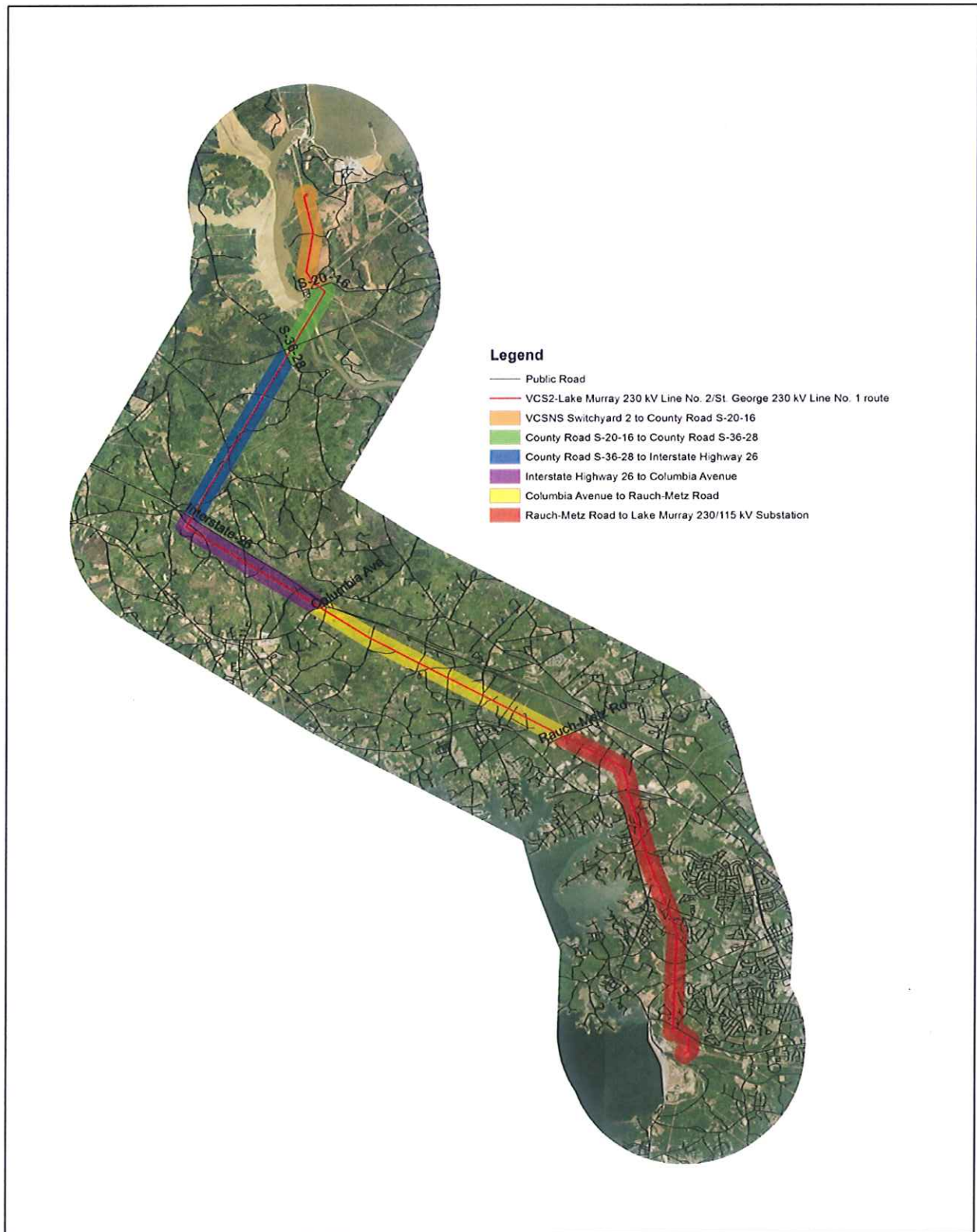


Figure 4.8-1 VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Scenic Quality Sections

The following is a discussion of the scenic conditions in each of the six (6) scenic quality sections and the resulting scenic quality score.

VCSNS Switchyard 2 to County Road S-20-16



From the VCSNS Switchyard 2, the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route runs for approximately 2 miles to County Road S-20-16 approximately ½ mile northeast of the Parr Hydro Station. This section of the line is on property owned by SCE&G and is highly modified by numerous existing transmission lines and associated cleared corridors, electrical substation facilities, storage yards and electrical generation facilities. With the exception of minor views from County Road S-20-16 where views of other transmission lines are common, views of the future line will be limited to observation points on the SCE&G property where it is not screened from view by surrounding pine and pine/hardwood forest stands.

VCSNS Switchyard 2 to County Road S-20-16 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	Little or no variety or contrast in vegetation. 1
Water	Flowing, or still, but not dominant in the landscape. 3
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Modifications add variety but are very discordant and promote strong disharmony. -4

Total Scenic Quality Score: 3

County Road S-20-16 to County Road S-36-28



The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route takes an approximately 90 degree turn to the southwest shortly after crossing County Road S-36-28 and runs through an undeveloped area. Characterized by mature stands of mixed pine/hardwood forests, the visual quality of this area is dramatically enhanced by a number of natural and cultural features. The line route crosses two channels of the Broad River that are separated by the heavily forested Hampton Island, which is approximately $\frac{1}{4}$ mile wide at the line crossing point. The visual character of this area is displayed prominently when viewing the Broad River and Hampton Island from the two S.C. Highway 213 bridges that span the river channels on each side of Hampton Island. Views of the river above and below the bridges are enhanced by the rock-laden streambed, riparian vegetation on each side of the river channels, and the flowing water.

The general vicinity of the line route shows signs of public recreation use. The SCE&G Trestle of the Palmetto Trail, a 20th century railroad trestle retrofitted for pedestrian use that is potentially eligible for the National Register of Historic Places (NRHP), crosses a ravine approximately $\frac{1}{2}$ mile southeast of the line route near the intersection of State Road S-36-172 and County Road S-36-28 (River Street). In the immediate vicinity of the trestle are picnic and canoe access areas. Another railroad trestle retrofitted for pedestrian use called the "Harry Easterling Bridge" crosses the Broad River approximately 1 mile south southeast of the line route. The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will not be visible from either trestle.

From the Broad River, the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route traverses approximately one-half mile of a dense, mature mix of pine/hardwood forests before it crosses S.C. Highway 213. The line route continues in a southwesterly direction for approximately $\frac{1}{4}$ past S.C. Highway 213 through a cleared area before reaching County Road S-36-28.

County Road S-20-16 to County Road S-36-28 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3
Vegetation	Some variety of vegetation, but only one or two major types. 3
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 4
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	Distinctive, though somewhat similar to others within the region. 3
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. 2

Total Scenic Quality Score: 16

County Road S-36-28 to Interstate Highway 26



After crossing County Road S-36-28, the line route intersects the Palmetto Trail at an approximate 80-degree angle in a dense pine/hardwood forest. The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route continues for approximately 3.3 miles, passing through pine hardwood forests, over clear-cut areas, and grass lands to its intersection with Interstate Highway 26.

The visual character of this line segment is typical of rural piedmont landscapes of South Carolina, with one notable exception. Along Lon Stoudemire Trail and State Road S-36-172 the topography transitions rapidly from gently rolling to steep. A stream, deep valleys, and hillsides along Lon Stoudemire Trail resemble landscapes found in the Blue Ridge Foothills region of North and South Carolina. While the majority of the area is covered by forestlands, small pockets of

agricultural fields and pasturelands contribute positively to the visual quality of the area. Residential development in the vicinity of this line section is very low density at approximately 1 house per 25 acres and is generally limited to the road corridors. The rural residential setting, with some old farmhouses and associated farm buildings, offers a very pleasing visual experience in the general area of the line route.

County Road S-36-28 to Interstate Highway 26 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3
Vegetation	Some variety of vegetation, but only one or two major types. 3
Water	Absent, or present, but not noticeable 0
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. 2

Total Scenic Quality Score: 10

Interstate Highway 26 to Columbia Avenue



The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route crosses Interstate Highway 26 approximately 0.34 miles southeast of the Holy Trinity Church Road overpass and continues another 0.2 miles until it intersects the Saluda Hydro-Newberry 115 kV Lines No. 1 and 2 right-of-way. At this point, the route of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 turns and runs the Saluda Hydro-Newberry right-of-way in a

southeasterly direction for approximately 2 miles to Columbia Avenue. The visual character in this general area is enhanced by its variety in vegetated areas including, planted pine plantations, mixed pine/hardwood forests, as well as large agricultural fields planted in sunflowers, which break the monotonous green color palette. Residential development along this section of line is low at only 1 house per approximately 30 acres of land.

Interstate Highway 26 to Columbia Avenue Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	Some variety of vegetation, but only one or two major types. 3
Water	Absent, or present, but not noticeable 0
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements. 0

Total Scenic Quality Score: 6

Columbia Avenue to Rauch-Metz Road



The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route crosses Columbia Avenue near the I-26 interchange in an area highly modified by commercial development and existing electrical transmission and distribution lines. The line route continues for approximately 2 miles where it crosses Old Hilton Road. Approximately 1 mile further, the line route joins and runs parallel with a Santee Cooper 69 kV line. The VCS2-Lake Murray 230 kV Line

No. 2/St. George 230 kV Line No. 1 then crosses the Santee Cooper line and continues through moderately developed residential areas for approximately 1.8 miles until it reaches Rauch-Metz Road. With the increase in residential development in the vicinity of the line route, the visual quality of the area is highly modified by residences (including high-density subdivisions), roads, road signage, schools and electrical transmission and distribution lines. Large tracts of forestland are limited in the general area due to fragmentation resulting from development activity and the road network.

Columbia Avenue to Rauch-Metz Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	Little or no variety or contrast in vegetation. 1
Water	Absent, or present, but not noticeable 0
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Modifications add little or no visual variety to the area, and introduce some discordant elements. -2

Total Scenic Quality Score: 2

Rauch-Metz Road to Lake Murray 230/115 kV Substation



From the point where the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route crosses Rauch-Metz Road, the line route continues for approximately $\frac{1}{2}$ mile to a small residential development on Adderley Oak Drive, before entering and passing through an area of pines and mixed hardwoods that appear to be vegetative regeneration from a clear-cut 15-20 years ago. Exiting the stand of young pines and hardwoods, the route skirts the edge of a high-density residential subdivision for approximately $\frac{3}{4}$ mile immediately before reaching U.S. Highway 76. For approximately 1.5 miles after crossing U.S. Highway 76, the route passes through relatively undeveloped area, crossing Signal Lane and Farming Creek Road before reaching a residential subdivision along Leamington Way. The line route continues in a southeasterly direction through residential developments until it turns in a southerly direction for approximately 1 mile before crossing Lake Murray Boulevard (S.C. Highway 60), a primary thoroughfare. The line route passes through the Coldstream Golf Club and across Bush River Road before reaching the Lake Murray 230/115 kV Substation.

The visual character in the vicinity of this segment of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route is highly modified by residential and commercial development. While the vegetation in the area has been significantly altered by development, the water body of Lake Murray is a dominant factor in characterizing the landscape. Cultural features are also well represented in the area, providing a medium for visual interest such as the earthen dam that is only 0.5 miles east of the Lake Murray Substation. Striking views are found along North Lake Drive (S.C. Highway 6) as it crosses the Dreher Shoals Dam. From this vantage point can be seen the Columbia skyline to the east-southeast and pristine lake views in the opposite direction. Additionally, the massive Dreher Shoals Dam features greatly exceed normal human scale features to the point that they captivate attention and imagination. Other visually intriguing cultural features include marinas, beaches, and parks within the vicinity of the line route.

Rauch-Metz Road to Lake Murray 230/115 kV Substation Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3
Vegetation	Little or no variety or contrast in vegetation. 1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 5
Color	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. 3
Scarcity	Interesting within its setting, but fairly common within the region. 1
Cultural modifications	Some modifications add visual variety to the area while others introduce discordant characteristics. 0

Total Scenic Quality Score: 14

Summary

Application of the BLM methodology for assessing scenic quality along the route of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 reveals the line route will be located within low scenic quality areas (total scenic quality scores of 11 or less) with the exception of two Visual Quality Segments of the line route—the County Road S-20-16 to County Road S-36-28 and Rauch-Metz Road to Lake Murray 230/115 kV Substation Visual Quality Segments, both of which are in the moderate visual quality range. This evaluation does not necessarily indicate lack of pleasing and memorable scenic conditions in the areas receiving low visual quality scores; rather, it is a metric that correctly indicates a general absence of topographic features that would offer interesting elevation relief and long views and vistas, lack of landscape diversity (especially texture and color), lack of adjacent scenic features visible from the immediate area of the line route, and the degree to which the line passes through areas that are highly modified by various types of development and infrastructure. It is also a metric that is instructive in terms of the area's ability to "absorb" visual change resulting from the addition of man-made elements. The potential for adverse visual impacts are greater when man-made elements are added in areas with high visual quality while the potential is lower when they are added in areas with low visual quality. Thus, it is an indicator of an area's ability to absorb visual modifications, such as those associated with the future line, with minimal adverse impacts to the area's scenic quality.

5.0 CONSEQUENCES OF THE PROPOSED ACTION

This chapter describes short- and long-term effects to environmental resources, land use, and cultural resources that will occur as a result of construction and operation of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1. An array of environmental, cultural resource, land use and scenic data were collected from various local, state and federal agencies and developed from field studies to support the findings presented in this chapter. The data were organized into data layers and mapped for the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Line data collection and analysis area (*Figure 4.0-1*).

5.1 Soils

The potential for soil erosion exists where it will be necessary to expose mineral soils during grading associated with access road improvement and augering for transmission structure erection. Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts, and disturbed soils will be stabilized with vegetation as construction progresses over the length of the affected rights-of-way. Very minimal grading and earthwork activities are anticipated due to the utilization of existing rights-of-way and access roads. Moreover, SCE&G uses “no-grub” clearing techniques wherever clearing is required and will comply with the South Carolina Stormwater Management and Sediment Reduction Act with all right-of-way and line construction operations. SCE&G will use clearing, seeding, and erosion-control procedures that meet or exceed the standards set forth in local, state, and federal requirements and will comply with agency recommendations regarding prevention of soil erosion and sediment movement.

5.2 Prime Farmlands and Farmlands of Statewide Importance

Prime farmland is comprised of soils (and slopes) that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to sound farming methods. In general, prime farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time. Typically, they do not flood during the growing season or they are protected from flooding.

Farmlands of Statewide Importance are soils that are, in addition to prime farmland, important for the production of food, feed, forage, fiber, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 5.2-1 lists the acreage of Prime Farmland and Farmland of Statewide Importance that occur in the right-of-way corridors of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 (*Figure 5.2-1*).

Chart 5.2-1 Affected Prime Farmland and Farmland of Statewide Importance

	Acres
All Areas Are Prime Farmland	69.7
Farmland Of Statewide Importance	119.1
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	14.5
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	2.5
Not Prime Or Important Farmland	75.2

Farming, including crop production, is a permitted use on SCE&G transmission line rights-of-way throughout its system.

5.3 Water Resources

The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will cross a number of streams (Section 4.3) along its route from the VCSNS Switchyard 2 to the Lake Murray 230/115 kV Substation (*Figure 5.3-1*). Any existing low-growing vegetation will be left intact to the maximum practical extent in stream buffer zones, and root mats in any specified buffer zones will not be disturbed.

Construction of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will present the potential for erosion and runoff contributions to nearby streams and wetlands; however, the use of existing, established rights-of-way greatly minimizes the potential of this impact. Where required, SCE&G will carefully design measures and plan work to prevent any sediment-laden runoff beyond designed erosion-control devices (sediment basins, sediment traps, silt fences, etc.). SCE&G will comply with the South Carolina Stormwater Management and Sediment Reduction Act related to water quality protection and will comply with the recommendations of various regulatory agencies, including the South Carolina Department of Natural Resources, South Carolina Department of Health and Environmental Control, the U.S. Army Corps of Engineers, etc. All

activities will be conducted in a manner that will not jeopardize the State water quality standards and existing water uses. The erosion-control measures and Best Management Practices employed will be sufficient to prevent any sediment movement beyond construction limits during a 10-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas.

The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will span over wetlands along its route (*Figure 5.3-2*); however, no access roads will be built in wetlands; wetland contours will not be changed; and no wetlands will be converted to uplands. To the maximum extent practical, SCE&G will design the lines to avoid placement of line structures in wetlands. SCE&G will use selective clearing measures in forested wetlands, leaving the root zone and as much low growing vegetation as possible in the wetlands and associated wetland buffers to prevent erosion. Only those trees that pose a current or potential safety problem (i.e., trees that would or will interfere with the reliable, safe operation of the lines) will be removed. Clearing in forested wetlands will be done by hand-clearing methods or by high-flotation equipment suitable for operation in wetlands. Moreover, all work in wetlands will be done in strict compliance with U.S. Army Corps of Engineers 404 Permit conditions, which SCE&G will obtain before line construction begins.

Before construction begins on the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, supervisors will be given plan-and-profile drawings for the projects to provide them with locations of the structures and specific locations and requirements of any sensitive areas, including stream buffers and wetlands. All state and federal permits related to wetlands and water quality protection will be obtained before construction begins, and periodic inspections will be performed during construction to ensure compliance with all permit conditions and application of construction practices designed to protect sensitive resources.

Chart 5.3-1 lists all hydrological resources that could potentially be affected by construction activities associated with the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1; however, because of the measures SCE&G will implement to protect wetlands, no impacts are anticipated except for the conversion of 6.1 acres of forested wetlands to permanent herbaceous wetlands.

Chart 5.3-1 Affected Wetlands and Stream Buffers

	Acres
Acres of river, lake or pond in the right-of-way	2.7
Acres of wetland within the right-of-way impacted by clearing within the wetland	6.1
Acres of wetland within the right-of-way not impacted by clearing within the wetland	1.9
Acres of upland within the right-of-way requiring hand-clearing within 100' of any stream, river, lake, pond, or wetland	14.1
Acres of upland within the right-of-way and not requiring clearing within 100' of any stream, river, lake, pond, or wetland	12.6
Acres of river, lake or pond outside the right-of-way and within the 2000' route corridor	80.3
Acres of forested wetland outside the right-of-way and within the 2000' route corridor	28.6
Acres of non-forested wetland outside the right-of-way and within the 2000' route corridor	3.4
Acres of forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	384.2
Acres of non-forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	184.4

5.4 Flood-Prone Areas

SCE&G obtained the Federal Emergency Management Agency National Flood Insurance Program maps for areas that might be affected by the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 (*Figure 5.4-1*). The maps were compiled and intersected with the proposed line route to ascertain and quantify effects. The results are summarized in Chart 5.4-1.

Chart 5.4-1 Affects to FEMA Flood Zones

	Acres
Zone AE - Floodway	0.2
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	0.2
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	21.5
Zone C - Areas of Minimal Flooding	30.1
Zone X - Areas Determined to be Outside 500-Year Floodplain	229.1

The U.S. Department of Agriculture, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used on the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will have no measurable effect on floodplain values, and the reliability of the lines will not be affected by the segments of the lines that will reside in floodplain zones. Moreover, when engineering the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV

Line No. 1, SCE&G will avoid locating transmission line structures in flood zones to the maximum extent practical.

5.5 Land Use

SCE&G collected and mapped existing and future land use data over the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route (*Figures 5.5-1 and 5.5-2*). Also, the zoning classifications, where applicable, were mapped. The most significant effect to land use resulting from construction of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will be the permanent restriction on the erection of buildings and timber production in the right-of-way; however, since the line will be built on existing SCE&G rights-of-way, those restrictions have been in force and effect for decades. Permitted uses in the right-of-way will include pastures, crop production, roads, driveways, parking lots, and other uses that will not interfere with the safe, reliable operation of the line. Chart 5.5-1 lists the acreages of land uses within the right-of-way for the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1.

Chart 5.5-1 Affected Land Use

	Acres
Electrical Transmission Right-of-Way - South Carolina Electric and Gas Company	258.3
Major Roadway	2.0
Power Generation	13.3
Railroad Right-of-Way	1.3
Secondary Roadway	6.3

The locations of all occupied buildings within 1,000' of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route were digitized from aerial photography and field studies and compiled in a GIS data base (*Figure 5.5-3*). Chart 5.5-2 displays the quantity of occupied buildings that will be within various distances of the future line.

Chart 5.5-2 Proximity of Occupied Buildings

	Number
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	1
Number of occupied buildings outside of the R/W and within 200' of the proposed line	147
Number of occupied buildings between 200' and 500' of the proposed line	450
Number of occupied buildings between 500' and 1000' of the proposed line	615
Total	1213

5.6 Land Cover

A land cover inventory was developed for the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route from 2009 United States Department of Agriculture (USDA) aerial

photography (*Figure 5.6-1*); wetland vegetation was further defined by an analysis of 2006 Color Infrared USGS Digital Ortho Quad (DOQ), USDA Soils Data, USGS/SCDNR Hypsography, and USFWS National Wetlands Inventory. Scrub/Shrub (mostly vegetation re-growth) is the dominant land cover in the existing, cleared right-of-way within which the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will be built. Chart 5.6-1 lists the quantity and types of land cover that will be affected by the future line.

Chart 5.6-1 Affects to Land Cover

	Acres
Barren	10.1
Cropland	5.6
Grass/Pasture	23.6
Hardwood Forest	87.6
Mixed Hardwood/Pine Forest	0
Pine Forest	24.4
Riparian Vegetation	0
Scrub/Shrub	109.9
Urban/Built-up	9.8
Water	2.3
Wetland	8.0

5.7 Wildlife

Various studies (Duke Power Company et al, 1976; Michael et al., 1976; Shreiber et al., 1976; Cavanagh et al., 1976) conclude that rights-of-way clearing through forested areas will have an effect on the fauna of the immediate area. In the Duke Power study, which was conducted in the Piedmont section of South Carolina (Rock Hill-Lancaster region), it was found that herbaceous and brushy plant communities that become established in Piedmont transmission line corridors provide a habitat that:

- 1) Precludes use of the area by some of the pre-existing species such as some woodland birds and small mammals;
- 2) Enhances aspects of the area for some pre-existing species, providing them with certain beneficial factors associated with food and cover; and
- 3) Encourages invasion by species previously absent in the area.

Species discouraged from inhabiting cleared areas of the corridor are those restricted to woodland habitats. Of the birds of the Piedmont, such species would include many warblers, woodpeckers, Carolina chickadee, tufted titmouse, yellow-billed cuckoo, crested flycatcher, brown-headed nuthatch, wood thrush, red-eyed vireo, and rose-breasted grosbeak, among others. Examples of mammals that would be discouraged from the area would be the white-footed mouse and golden mouse.

Species that would benefit from the new habitat provided by cleared areas include vultures, hawks, foxes, and possibly other predators. These species, though generally associated with other habitats, seem to concentrate portions of their activities in cleared corridors. Vultures and hawks (especially the red-tailed hawk) are commonly seen perched on transmission line towers or soaring over the corridors. Possibly these perches, in conjunction with the dense rodent populations of the corridors, provide better hunting areas. The fact that small mammal populations are denser in corridors than in woodlands may account for the use of corridors by foxes. Studies have shown that foxes commonly feed on the cotton rat and meadow vole in transmission line corridors. Thus, a typical woodland animal, such as the gray fox, may commonly venture into corridor habitats because of the accessible food supply.

Species previously absent or uncommon that move into an area following the establishment of a transmission line corridor, are those typically associated with open spaces or with herbaceous or brushy habitats. In the Piedmont, such species of birds would include various sparrows, meadowlark, red-winged blackbird, blue grosbeak, prairie warblers, yellow-throat, yellow-breasted chat, and indigo bunting, among others. Mammals include the rice rat, cotton rat, meadow vole, and harvest mouse. Certain amphibians (upland chorus frog, southern leopard frog) that prefer to breed in open grassy areas also benefit from transmission line corridors.

Among the birds that inhabit transmission line corridors, some actually live in the herbaceous vegetation of the corridor, while others inhabit areas along streams passing through the corridor or trees adjacent to the corridor. Examples of the former include the field sparrow, song sparrow, meadowlark, red-wing, and yellow-throat, among others. Species inhabiting trees on the immediate edge of a corridor or trees along a stream crossing are sometimes called "edge species." These species, which include in part the indigo bunting, yellow-breasted chat, prairie warbler, and towhee, prefer to inhabit woodlands adjacent to open spaces. Thus, while they inhabit trees, their presence is due to the open nature of the corridor.

Also, transmission line corridors, as managed by SCE&G, support an assemblage of non-game species. The planted and invading native vegetation, in conjunction with the small trees left in selected locations, create a habitat for various species preferring open herbaceous habitats and edge habitats. These anticipated and predicted corridor clearing effects will occur over approximately 42% of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route corridor.

The creation of linear openings in heavily timbered areas is a standard wildlife management

technique to increase the carrying capacity for woodland game. Thus, the open corridor segments that will be created along the Parr Hydro-Chapin Junction right-of-way segment of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 and the resulting establishment of herbaceous and brushy plant communities should be advantageous to the larger game animals in the area (deer and wild turkey), as well as certain non-game species.

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that all new transmission structures be equipped with design features that prevent these electrocutions. Such features typically include designs that (1) make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail. The structures that will be used for the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route will be "raptor safe" and meet the guidelines recommended in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated on this project.

5.8 Cultural Resources

The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 is an integral part of the VCSNS Units 2 and 3 project and is included in the application filed by SCE&G and Santee Cooper on March 31, 2008 to the NRC for a COL for the two new nuclear generating units (VCSNS Units 2 and 3). Consequently, construction of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 is a "federal undertaking" and must be conducted pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966. The following provides background information regarding the federal requirements and federal agencies that will have a role in the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 project.

Background Information Regarding Federal Requirements

The NRC has prepared and published Environmental Standard Review Plans ("ESRPs") for the guidance of the Office of Nuclear Reactor Regulation staff responsible for environmental reviews for nuclear power plants. These documents are made available to the public as part of the

NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. ESRPs are not substitutes for regulatory guides or the NRC's regulations, and compliance with them is not required. The ESRPs are keyed to preparation of Environmental Reports for Nuclear Power Stations. NUREG-1555 is the ESRP for New Site / Plant Applications and requires the identification of any historic properties within 16 km (10-mi.) of the plant site and within 2 km (1.2-mi.) of proposed transmission line routes, access corridors, and offsite areas that are in or have been determined eligible for inclusion in the National Register of Historic Places ("NRHP") or are included in State or local registers or inventories of historic and cultural resources. Moreover, NUREG-1555 provides guidance on specific studies, information, and types of data that must be conducted and considered in order to determine the types and magnitude of potential impacts to cultural resources that may result from proposed actions.

Planned construction of the two new nuclear generating units at the existing V.C. Summer Nuclear Station will result in the placement of fill in waters of the United States. Additionally, new transmission lines that must be constructed in conjunction with the new nuclear generating units will cross federal and state navigable waters and will result in the conversion of forested wetlands to permanent herbaceous wetlands. Thus, the planned action will require federal permitting pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 and is therefore considered to be a federal undertaking.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, the effects of any federal undertaking on historical resources must be considered prior to the beginning of construction. As part of their responsibilities related to the federal permits under their jurisdiction (Section 404 and Section 10 Permits), the USACE entered into consultation with the SHPO to discuss the management of cultural resources as it relates to this project and compliance with Section 106 of the National Historic Preservation Act. The USACE is a "cooperating agency" within the context of the National Environmental Policy Act where the NRC is serving as the lead agency preparing an Environmental Impact Statement for the federal undertakings. The USACE must satisfy NEPA requirements and its internal regulations regarding consultation obligations associated with its Section 404 and Section 10 Permit decisions, which includes consultation with the SHPO regarding Section 106 of the National Historic Preservation Act.

Pursuant to the joint responsibility shared by SCE&G, the SHPO, and the USACE to ensure compliance with Section 106 of the National Historic Preservation Act, the parties (SCE&G, SHPO and USACE) have entered into a Cultural Resources Management Plan and Agreement ("CRMPA") that specifies how SCE&G will identify, assess, and protect cultural resources that

could potentially be impacted by the construction, operation and maintenance of the VCSNS Units 2 and 3 and associated transmission lines, including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route (*Appendix B*).

As part of its obligations under the CRMPA, SCE&G contracted with a “*professional meeting the Secretary of the Interior’s Professional Qualifications Standards in history or architectural history*,” Brockington and Associates, Inc. (“Brockington”), to conduct cultural resource investigations along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route. Specifically, the investigations focus on the geographic area within 1.2 miles on either side of the route’s centerline, which is referred to as the “*study area*,” and contains 59 square miles. In the following four (4) categories are descriptions of the investigations SCE&G contracted Brockington to conduct along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route.

1. Literature Review-Architecture:

This review was conducted to determine if any properties or sites in the study area have been recorded in the records of the South Carolina Department of Archives and History (“SCDAH”) in Columbia, South Carolina, and the NRHP eligibility status of each recorded resource. The data, which the SCDAH maintains in a computerized Geographic Information System, include the following:

- All aboveground resources recorded after 1989, including their NRHP eligibility;
- All cultural resources studies conducted since 1989;
- All archaeological sites, structures, and districts that are listed on the NRHP.

Additionally, Brockington conducted a search of the SCDAH Finding Aid to determine cultural resource investigations, and associated findings, that took place before 1990. The Finding Aid is an electronic document that lists all cultural resources projects that have occurred in a given county. The SCDAH review revealed that a limited number of pre-1990 aboveground resources surveys were conducted in Fairfield, Richland, Newberry and Lexington Counties; however, the data contained in these early studies were not collected using current survey methods and standards. Furthermore, in Brockington’s opinion, the surveys are not comprehensive or reliable because the condition of many of the buildings surveyed prior to 1990 likely has changed and many buildings not surveyed at that time because of age may now meet the minimum 50-year age requirement for survey. Structures recorded during pre-1990 surveys were rarely assessed for NRHP eligibility followed by a formal Determination of Eligibility (“DOE”) by the SCDAH. For these reasons,

Brockington did not attempt to include every structure surveyed prior to 1990 in the GIS database it developed for SCE&G; however, all structures recorded prior to 1990 that are listed on the NRHP were included in the database Brockington prepared for SCE&G and field verified during the windshield survey (see #3, below).

2. Literature Review-Archaeology:

This review was conducted primarily by utilizing “ArchSite,” which is South Carolina’s online cultural resources GIS database, to determine previously recorded archaeological sites in the study area (*Appendix C*).

3. Windshield Survey:

A windshield survey was conducted to identify architectural/aboveground resources in the study area that appear, in the opinion of experienced architectural historians, to possess characteristics (age, architectural integrity, etc.) that would possibly make them eligible for the NRHP pending more intensive assessment studies (*Appendix D*). As outlined in National Register Bulletin #24, a windshield reconnaissance-level survey is useful in ascertaining “a general picture of the distribution of different types and styles [of architectural resources], and of the character of different neighborhoods” (Parker 1985:35-36). Windshield surveys are also useful for making *preliminary* assessments of eligibility based on the architectural integrity of properties, but not in ascertaining the historical associations a property might possess. The specific objectives of the windshield reconnaissance were to:

- Evaluate all previously recorded architectural resources (if any);
- Locate architectural resources not previously recorded and that appear to meet the minimum fifty-year age requirement for the NRHP; and
- Identify potentially eligible NRHP properties.

4. Phase I Archaeological Resources Survey:

A Phase I Archaeological Resources Survey was conducted throughout the existing rights-of-way within which the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be built. Conducted by Brockington, it extended from the Lake Murray 230/115 kV Substation to the VCSNS project boundary, which intersects the line route approximately 2 miles before it reaches the VCSNS Switchyard 2; the archaeological investigation for the remaining 2 miles of the line route to VCSNS Switchyard 2 was completed in conjunction with the VCSNS site investigation. The Phase I survey conducted by Brockington was pursuant to

the CRMPA and SCE&G's obligations under the South Carolina Utility Facility Siting and Environmental Protection Act, South Carolina Code Ann. § 58-33-10 et seq. (1976, as amended), to determine effects to cultural resources, if any, that could possibly occur from construction of the VCS2-Lake Murray Line No. 2/St. George Line No. 1. During line construction, if any unforeseen land disturbance should be necessary, SCE&G will consult with the SHPO and USACE, pursuant to the CRMPA, regarding any additional Phase I Archaeological Surveys that may be necessary before beginning the land-disturbing activities.

Findings of the Literature Review-Architecture

There are 128 previously recorded aboveground resources within the study area (i.e., within 1.2 miles of the proposed line route (*Figure 5.8-1*). SCDAH classifies the resources as follows:

- Listed on the NRHP: 1
- Eligible for the NRHP: 9
- Potentially eligible for the NRHP: 2 (includes 1 cemetery⁷)
- Protected Resource (cemetery) Ineligible for the NRHP: 4
- Not eligible for the NRHP: 112

No architectural properties designated as National Historic Landmarks (NHL) or recorded historic districts are recorded within the study area.

Findings of the Literature Review-Archaeology

Using the SCDAH Archsite database, it was determined that seventy-three (73) archaeological sites have been previously recorded within 1.2 miles of the future line (*Figure 5.8-1*) as follows:

- Potentially eligible for NRHP: 3
- Not eligible or probably not eligible for the NRHP: 57 (includes 1 cemetery)
- Unassessed or undetermined eligibility status: 13 (includes 1 cemetery)

Of the total number of seventy-three, forty-four (44) reside within ½ mile of the future line.

⁷ Cemeteries are protected resources in South Carolina regardless of NRHP status and are commonly found in architectural and archaeological records.

Findings of the Windshield Reconnaissance

Brockington conducted a windshield reconnaissance of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 study area. In the past, much of the 59 square mile study area has been used for agriculture purposes, but agricultural uses are now primarily limited to the more sparsely developed areas on the northern section of the line route. Much of the building stock in the area consists of mid-twentieth century middle-income housing and late-twentieth century modular homes, with a heavy concentration of suburban development in the Irmo and Lake Murray areas, including substantial development along the Lake Murray shoreline. The study area is characterized by a variety of architectural types and styles, but there is no one particular architectural theme or style.

The literature review (Literature Review-Architecture, hereinabove) identified all of the previously recorded aboveground structures in the Study Area. During the windshield reconnaissance, Brockington confirmed that the one site listed on the NRHP, the John Jacobs Calhoun Koon Farmstead, is still intact. Of the one hundred sixteen (116) resources that had been previously recorded as ineligible for the NRHP, Brockington's windshield inspection determined that nineteen (19) of them should be considered to be potentially eligible resources. Also, Brockington identified an additional nineteen (19) aboveground resources and one (1) historic district (Peak, SC) not previously recorded that appear to be eligible for inclusion in the NRHP; thus, according to the windshield, fifty (50) resources that are potentially eligible for the NRHP reside within 1.2 miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route. The total represents the eleven (11) previously recorded resources; the nineteen (19) resources that were previously recorded as not eligible but, according to Brockington, appear now to be eligible; and the additional twenty (20) resources, including the historic district, that were not previously recorded.

Numerous other properties that appear to be 50 years old (thus, meeting the minimal standard for NRHP eligibility consideration) were observed throughout the study area and, as such, are properties that would be recorded by architectural historians during a standard Section 106 survey. Due to significant alterations or modifications, Brockington determined that these properties appear to have lost their architectural integrity and may not meet the criteria of eligibility for listing on the NRHP under Criterion C; however, these properties, which Brockington did not include in the windshield survey database, may possess historical significance which could only be determined through archival research such as would be required for a Section 106 cultural resources survey. For the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, Brockington recommended that a viewshed analysis be conducted after new structure locations

have been determined. A viewshed analysis would delineate the specific areas that will have high probability of views of the VCS2-Lake Murray Line No. 2/St. George Line No. Combined, these delineated high probability areas would constitute the “area of potential effect” (“APE”), and could be used as a basis for a Phase I Architectural Survey for full Section 106 compliance. A Phase 1 Architectural Survey would include more intensive analysis of structures and the development of sufficient information to solicit eligibility determinations from SCDAH. The results of Brockington’s windshield survey are summarized in a letter report dated July 12, 2011 (*Appendix D*).

Pursuant to Brockington’s recommendation that a viewshed analysis be conducted, Pike Energy Solutions, LLC, (“Pike”) working closely with Brockington on SCE&G’s behalf, conducted a viewshed analysis to determine the footprint of the geographic area within 1.2 miles of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route where views of the future line may be possible. The analysis was based on preliminary engineering that included the locations and heights of the proposed new double-circuit 230 kV transmission line structures. Computer modeling was completed based on the top elevation of each line structure, taking into consideration topography and vegetation. This exercise yielded mapping, a GIS data layer, showing where future views of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 may be possible within 1.2 miles of the future line (i.e., the APE). The viewshed analysis was overlaid onto the GIS data layer with the locations of the one (1) resource listed on the NRHP (a farmstead) and the fifty (50) resources that appear to be potentially eligible for the NRHP (including the potentially eligible historic district of Peak, South Carolina). This exercise resulted in the identification of six (6) potentially eligible resources that reside in areas (the APE) within 1.2 miles of the future line that may have views of the line. Two (2) additional resources were added to the list of six (6) because Pike landscape architects believed they may have possible “borderline” views of the line even though the viewshed analysis suggested otherwise.

A field study was conducted that focused on the eight (8) resources identified during the viewshed analysis; however, all fifty-one (51) resources were visited and carefully inspected by Pike landscape architects and geographic information system specialists. The field study confirmed forty-four (44) of the fifty-one (51) will have no views of the future line. Of the six (6) resources that reside in possible view areas as determined by the viewshed analysis plus the two (2) that were added, the field investigation determined that one (1) will not have a view of the future line; the remaining seven (7) will have views that will not be evident to casual viewers or will be insignificant.

In summary, the viewshed analysis conducted by Pike determined that the future VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will have no adverse visual impact on cultural resources within 1.2 miles of the lines' route.

The viewshed analysis, entitled "*Visual Impact Assessment of NRHP-Listed/Eligible Properties within 2 km of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1*" is included in this report (*Appendix G*).

Findings of the Phase I Archeological Survey

From March 21 until April 8, 2011, Brockington conducted a Phase I archaeological resources survey of the approximate 20 mile-long VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route.⁸ The Phase I archaeological survey was conducted on SCE&G's behalf for the purpose of determining if any archaeological resources would be affected by ground disturbance associated with right-of-way preparation and line construction. Survey methods undertaken during the investigation process were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended through 2000), and 36 CFR 800 (Protection of Historic Properties). Survey tasks were completed in compliance with criteria defined under the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61).

Primary archaeological resource investigations involved systematic 30-meter interval shovel testing along two transects spaced 30 meters offset on each side of the proposed centerline of the future 230 kV line, which is called the area of potential effects ("APE"). The Phase I survey included a review of previously recorded archaeological sites within or near the proposed transmission line right-of-way (see Literature Review-Archaeology, hereinabove), and a thorough pedestrian survey within the proposed right-of-way.

Background research was conducted at the South Carolina Institute of Archaeology and Anthropology (SCIAA) in Columbia, South Carolina, to determine if any previously recorded archaeological sites exist within the existing rights-of-way within which the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will be built. In addition, the list of NRHP properties was reviewed at the SCIAA. Seventy-three (73) previously recorded archaeological sites have been recorded within ½ mile of the right-of-way in which the VCS2-Lake Murray 230 kV Line No.

⁸ Brockington's investigation ended at the VCSNS project boundary near Parr Hydro Station. The additional 2 miles of the line route was investigated by New South Associates, Inc. in conjunction with their cultural resources investigation on the VCSNS site. They determined that no adverse effects will occur as a result of building the VCS2-Lake Murray No. 2/St. George No. 1 Line on the 2 mile portion of the route that resides within the project boundary.

2/St. George 230 kV Line No. 1 will be built. One of the sites, recorded as ineligible for the NRHP, is within the right-of-way footprint, but has been destroyed subsequent to the date it was recorded.

Brockington excavated a total of 1,415 shovel tests along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route, resulting in the identification of four previously unrecorded archaeological sites within the 20 miles of right-of-way investigated. Two of these sites, 38LX610 and 38LX611, are low-density prehistoric lithic and artifact scatters. Site 38RD1380 is a low-density historic artifact scatter and a standing structure that is located nearby, but not in the line right-of-way. Site 38RD612 represents a multi-component prehistoric and historic artifact scatter. According to Brockington, these four (4) sites are typical of low-density prehistoric and historic scatters located throughout the southeast and do not generally display the wealth of material and features often associated with significant archaeological resources in South Carolina. Brockington recommends all of them as “not eligible” for the NRHP.

In its report, entitled *A Phase I Archaeological Resources Survey of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, Fairfield, Richland, Newberry and Lexington Counties, South Carolina (Appendix D)*, Brockington recommends no further research in regard archaeological resources because the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 “. . . will have no effect on any previously identified or newly recorded archaeological resources.”

Charts 5.8-1 lists cultural resource factors listed in the records of the South Carolina Institute of Anthropology and Archaeology (“SCIAA”) and South Carolina Department of Archives and History (“SCDAH”) that are present in the vicinity of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route.

Chart 5.8-1 Affected Cultural Resources

	Number/Acres
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	3
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	1
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	2
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	0
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for the NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for the NRHP within ¼ mile of the transmission line	4
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	0
Number of Historic Sites Eligible/Potentially Eligible for the NRHP between ¼ and ½ mile of the transmission line	7
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	1
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	39
Acres of Designated Historic District Listed on the NRHP in the R/W	0
Acres of Designated Historic District Potentially Eligible for the NRHP in the R/W	0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	0
Acres of Designated Historic District Potentially Eligible for the NRHP within 100' of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	0
Acres of Designated Historic District Potentially Eligible for the NRHP between 100' and 1/4 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	0
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/4 and 1/2 mile of the R/W	0
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	0
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/2 and 1-1/4 mile of the R/W	34.1

* One site is recorded as residing in the right-of-way, but it has been destroyed.

SCE&G will work closely with the SHPO and the USACE to comply with all terms and conditions of the CRMPA during final engineering of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 and during line construction. Based on the findings of the cultural resources investigations conducted by Brockington and the viewshed analysis conducted by Pike Energy Solutions, SCE&G is confident that the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will have no adverse effects on cultural resources, including visual impacts.

5.9 Scenic Resources

The visual implications of transmission lines are influenced by several factors. These include the distance from the viewer, the number of structures viewed, whether visible structures are seen against backdrops (vegetation, terrain, man-made elements) or silhouetted against the skyline, the degree of foreground elements that will offer screening, the amount of vegetative modification which contrasts with surrounding landscapes, and the overall scenic condition

(landscape content or context, cultural modifications, etc.) of the area in which the facility is seen. The potential visual implications of the future VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 were considered in by dividing the total length of the lines into the following three (3) segments:

1. VCSNS Switchyard 2-Parr Hydro Segment. The future two 230 kV lines or circuits, which will be built as one double-circuit line that will accommodate the two (2) circuits, will be located within the VCSNS project boundary for this segment. The length of this segment is approximately 2.5 miles.
2. Parr Hydro-Chapin Junction Segment. Over this approximate 4.5 mile long segment, the future lines will be located within an existing SCE&G right-of-way; however, the right-of-way does not have a transmission line on it now and vegetative clearing will be required except for a narrow strip that has been cleared for an existing distribution line that is now on the right-of-way.
3. Chapin Junction-Lake Murray Segment. The future double-circuit 230 kV line will be built on the existing Saluda Hydro-Newberry right-of-way beside an existing 115 kV double-circuit line on lattice steel towers. The length of this segment is approximately 15 miles.

VCSNS Switchyard 2-Parr Hydro Segment

The visual effects over this segment of line will be negligible. The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 that will be built as a double-circuit line on steel poles will replace an existing double-circuit line on lattice steel towers for the length of this segment except for approximately 1,000 feet. Except for the 1,000 feet section of line, no vegetative clearing will be required. Additionally, the visual condition in the vicinity of VCSNS Switchyard 2-Parr Hydro Segment is highly modified by existing transmission lines, substations, storage yards and electrical generation facilities.

Parr Hydro-Chapin Junction Segment

Over this segment of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route, an existing distribution line is on the right-of-way. Except for the 30-40 feet wide strip that has been cleared for the distribution line, vegetative clearing will be required, approximately 65-70 feet in width for the length of the line in forested areas, to accommodate the new double-circuit 230 kV line. The visual effects will be generally low due to the screening afforded by vast tracts of forested area this segment of the line traverses. A study was conducted to determine the portions of the future VCS2-Lake Murray Line No. 2/St. George Line No. 1 that will and will not be visible

from public roads. It was determined that approximately a ½ mile of the line will be visible; the remaining approximately 4 miles will not be visible. It should be noted that the greatest line visibility from public roads will occur at the road crossings where views directly along the right-of-way will be possible. Generally, existing trees along the roads on each side of the right-of-way will provide significant line screening as motorists approach the crossing point.

The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will cross the Palmetto Trail ("Trail") near Peak, South Carolina, along the Parr Hydro-Chapin Junction Segment. The Trail crossing point occurs in a heavily wooded area; thus, the presence of the line will not be apparent to Trail users on approaches to the right-of-way. At the crossing point, however, the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 will be visible on each side of the Trail in views down the right-of-way. This view condition could be easily mitigated by planting low-growing indigenous trees and shrubs that could safely exist under the conductors. Plantings could effectively "enclose" the trail and screen views along the right-of-way.

Chapin Junction-Lake Murray Segment

The visual impact of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be significantly mitigated along the Chapin Junction-Lake Murray Segment by virtue of the existing visual modifications that are afforded by the existing 115 kV line on lattice steel towers that now occupies the Saluda Hydro-Newberry right-of-way. Construction of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 beside the existing line will require additional clearing within the existing right-of-way, but the existing cleared corridor constitutes vegetative modifications that will substantially reduce the visual effects of the additional clearing. Due to the lack of significant topographical relief along the Chapin Junction-Lake Murray Segment, little screening of the double-circuit 230 kV line will be afforded by terrain features. Additionally, unlike the Parr Hydro-Chapin Junction Segment where the route runs through expansive forested areas, expansive cleared areas exist along the southern portion of the Chapin Junction-Lake Murray Segment, primarily due to commercial and residential development. The total length of the VCS2-Lake Murray Line No. 2/St. George Line No. 1 along this segment is approximately 15 miles, of which approximately 14.5 miles of the line will be visible from public roads, which is similar to the visibility of the existing 115 kV line. The majority of the 14.5 miles of line that will be visible from public roads will only be visible when the line is viewed from the actual road crossing point; in most cases, the line will not be significantly visible on approaches to the crossing point due to the screening effects of trees along the roads and along the line right-of-way. Generally, visibility of the VCS2-Lake Murray Line No.

2/St. George Line No. 1 will not be significant from public roads except at the crossing points, as is the condition with the existing 115 kV line that occupies the right-of-way.

The VCS2-Lake Murray Line No. 2/St. George Line No. 1 will pass through five (5) residential subdivisions that have been developed along the existing right-of-way. Houses in some of the developments have been built on the line of the right-of-way's edge or only a few feet away from the edge. Where the houses crowd the right-of-way, the VCS2-Lake Murray Line No. 2/St. George Line No. 1 will be a dominant visual feature from the yard areas, as is the existing 115 kV line.

In conclusion, the additional impact on visual effects (i.e., future conditions compared to current conditions) of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, will be low along the VCSNS Switchyard 2-Parr Hydro and Parr Hydro-Chapin Junction Segments. The visual effects of the line along the Chapin Junction-Lake Murray will be moderate due primarily to development that is in close proximity to the right-of-way.

5.10 Rare, Threatened and Endangered Species

Federally Listed Plant and Animal Species

Ground surveys were conducted for federally-listed rare, threatened and endangered plant and animal species within the transmission line rights-of-way corridors for all of the new 230 kV lines associated with the VCSNS Units 2 and 3 project, including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 route. Prior to beginning field surveys, the U.S. Fish and Wildlife Service ("USFWS") and the South Carolina Department of Natural Resources ("SCDNR") were contacted to obtain the most current known federally-protected species occurrence information. Following a meeting in Charleston, South Carolina, with USFWS officials to discuss field investigation methods and requirements, the agency provided SCE&G a geographic information system ("GIS") data layer containing the most recent federally-protected species occurrence information, including location data, which was then overlaid with maps depicting all of SCE&G's proposed transmission line corridors associated with the VCSNS Units 2 and 3 project (*Figure 5.10-1*). The USFWS data layer was cross-referenced with SCDNR's "South Carolina Rare, Threatened and Endangered Species Inventory" database to ensure complete coverage of known protected species occurrences. The USFWS's "South Carolina List of Endangered, Threatened and Candidate Species, July 2010" was used to determine which species surveys would be conducted within each county affected by the routes of the proposed 230 kV lines. According to agency records and at the time field investigations began, none of the federally-listed

threatened and endangered species was known to occur within or along the margins of any of the VCSNS Units 2 and 3 transmission corridors (Gaddy and Siler, 2010).

Potential habitats for all of the potentially-occurring federally-listed species were also plotted on study area mapping before fieldwork began. These potential habitat maps were compiled using natural color and infrared imagery of the study area with topographic, soil, and wetland features overlaid on the natural color and infrared imagery. Field investigations were conducted in those areas where apparent appropriate habitat was contained within or along the margins of the transmission line corridors (Gaddy and Siler, 2010). Approximately 87 field sites containing potential habitat were field investigated.

Surveys for the species listed as occurring in those counties through which the proposed transmission lines will traverse were conducted between October 19 and November 10, 2010. Based on field investigations, it was determined that the four new 230 kV lines associated with the VCSNS Units 2 and 3 project (including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1) are not likely to disturb the bald eagle; will have no effect on the shortnose sturgeon and rough-leaved loosestrife; and may affect, but are not likely to adversely affect, the frosted flatwoods salamander, smooth coneflower, Carolina heelsplitter, pondberry, wood stork, Canby's dropwort, and red-cockaded woodpecker. No federally-listed threatened or endangered species were found within or immediately adjacent to any of the proposed transmission line corridors (*Appendix E*).

State Listed Plant and Animal Species

In addition to conducting field investigations associated with federally-listed species, an investigation was conducted to search for state-listed endangered, threatened, and candidate species on the transmission line rights-of-way corridors within which the transmission lines associated with the VCSNS Units 2 and 3 project will be built, including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1.

A literature and internet review of the state-listed species potentially-occurring in or near the transmission line corridors was conducted in October 2010. Over 170 species of state-listed plants and animals are known from the seven counties within which the new lines will be located. Of these 170 species, 41 species are known to occur within five miles of the proposed routes for new transmission lines, including the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1. Potential habitat for only 17 of these 41 species occurs within the rights-of-way corridors

within which the new transmission lines will be built; therefore, the field investigation for state-listed species concentrated on these 17 species.

Before fieldwork for this inventory began, all SCDNR records—historical and current—for these 17 species (S. C. Department of Natural Resources, 2010) were plotted on maps containing all of the new SCE&G transmission line right-of-way corridors associated with the VCSNS Units 2 and 3 project. These potential habitats maps were compiled using natural color and infrared imagery of the study area with topographic, soil, and wetland features overlaid on the natural color and infrared imagery. Field investigations were conducted in those areas where apparent appropriate habitat was contained within or along the margins of the transmission line corridors. According to the SCDNR records, at the time this field inventory began, none of the 17 species was known to occur within or along the margins of any of the transmission right-of-way corridors.

Thirty-three sites in Calhoun, Fairfield, Newberry, Lexington, and Richland Counties were visited in late October 2010, and 20 additional sites in Orangeburg and Dorchester Counties were field-checked in early November 2010. No state or federal listed species were found along the route of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1. Only one state-listed species was found in the right-of-way corridors; Carolina St. Johns-wort (*Hypericum nitidum*) was found in the planned VCS2-St. George 230 kV Line Nos. 1 and 2 right-of-way corridor in Lexington County (*Appendix F*).

Based on the literature review of federal and state-listed rare, threatened and endangered species and extensive field investigations, adverse effects to protected species are unlikely to occur during construction of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1. Nevertheless, if SCE&G encounters any plant or animal species of concern during construction, proper agencies will be notified and appropriate steps will be taken to protect the resources.

5.11 Population

Population distribution and density was modeled as a GIS data layer along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 based on Year 2000 Census data (*Figure 5.11-1*). Chart 5.11-1 displays the length of each route in miles that will pass through various population density areas:

Chart 5.11-1: Population Density along the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route

	Miles
< 0.5 Acres per Person	0.6
0.51 - 1 Acres per Person	1.8
1.1 - 2 Acres per Person	0.9
2.1 - 4 Acres per Person	1.6
4.1 - 10 Acres per Person	4.7
> 10 Acres per Person	12.6

5.12 Aviation

Federal Aviation Administration ("FAA") Regulations, Part 77, establishes standards for determining obstructions in navigable airspace and sets forth requirements for FAA notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level. Also, notification is required if the obstruction is more than specified heights and falls within any restricted airspace in the approach to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For heliports, the restricted space extends 5,000 feet (0.8 nautical miles). No airports or airstrips are within 3.3 nautical miles of the project. No VCSNS 230 kV Line structures will exceed 200 feet in height. Chart 5.12-1 lists the number of aviation facilities in close proximity to the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route (*Figure 5.12-1*).

Chart 5.12-1: Aviation Facilities in the Vicinity of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 Route

	Number of Facilities
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	0
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	0
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	1

Following engineering of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1, SCE&G, if required by the design, will file proper notifications with the FAA, consult with them as necessary to resolve any conflicts and determine any measures that must be implemented to insure aviation safety.

5.13 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air in the vicinity of the conductors of a transmission line. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a "hissing" sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on the conductor can also serve as sources of corona.

Corona on transmission line conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and not very noticeable outside the transmission line right-of-way.

Another type of radio and television interference, known as gap-type noise, is caused by an oxidized film at the point of contact between two metallic electric hardware pieces. The film acts

as an insulator between the surfaces and small electric sparks, which produce noise and interference. Gap type interference normally causes radio or television interference within a mile or less of the source. When such an interference condition occurs, corrective actions can be taken to eliminate the source.

SCE&G's construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with the lines' operation.

5.14 Safety

To provide for public safety and protection, SCE&G will design and construct the VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of construction. SCE&G commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of these facilities.

5.15 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970's, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, "Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard." The NAS went on to say, "No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is “weak.” The NIEHS stated that “the results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger.” NIEHS Director Kenneth Olden, Ph.D., said, “The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to encourage reductions in exposure should continue.”

EMF levels drop sharply with increased distance from a power source. SCE&G has published information listing the typical 60 hertz magnetic field levels associated with 115 kV lines. Directly under the line, the range is 2.1-19.3 milliGauss (mG); at the edge of the right-of-way, the range is 0.6-3.4 mG; 50' from the edge of the right-of-way, the range is 0.3-1.9 mG. This data is the same as published by Duke Energy Corporation with respect to 100 kV lines. Moreover, Duke Energy publishes the following information regarding 230 kV Lines (SCE&G has not published similar data for 230 kV lines):

Under the line:	4.5 - 29.0 mG
Edge of right-of-way:	1.9 - 6.4 mG
50' from edge of right-of-way:	1.0 - 3.5 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. The following are typical magnetic field strength ranges for certain equipment as published by SCE&G and Duke Energy:

<u>Equipment</u>	<u>1 Inch</u>	<u>1 Foot</u>	<u>3 Feet</u>
Microwave oven	140.0 mG	65.0 mG	10.0 mG
Refrigerator	6.0 mG	4.0 mG	1.2 mG
Electric Range	250.0 mG	25.0 mG	2.0 mG
Electric Razor	500.0 mG	-	-
Hair Dryer	100.0 mG	30.0 mG	-
Electric can opener	5,000.0 mG	-	-
Computer terminal / TV	26.0 mG	3.4 mG	1.2 mG
Electric Clock	130.0 mG	15.5 mG	2.5 mG

5.16 Ozone

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. SCE&G takes care to eliminate or minimize corona discharge from random arcing through careful design of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765 kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The VCS2-Lake Murray 230 kV Line No. 2/St. George 230 kV Line No. 1 should not produce any detectable amount of ozone under any operating condition, and thus will pose no threat to environmental quality.